# THE

# PINETUM BRITANNICUM

## A DESCRIPTIVE ACCOUNT
OF
## HARDY CONIFEROUS TREES
CULTIVATED IN GREAT BRITAIN

VOL. III.

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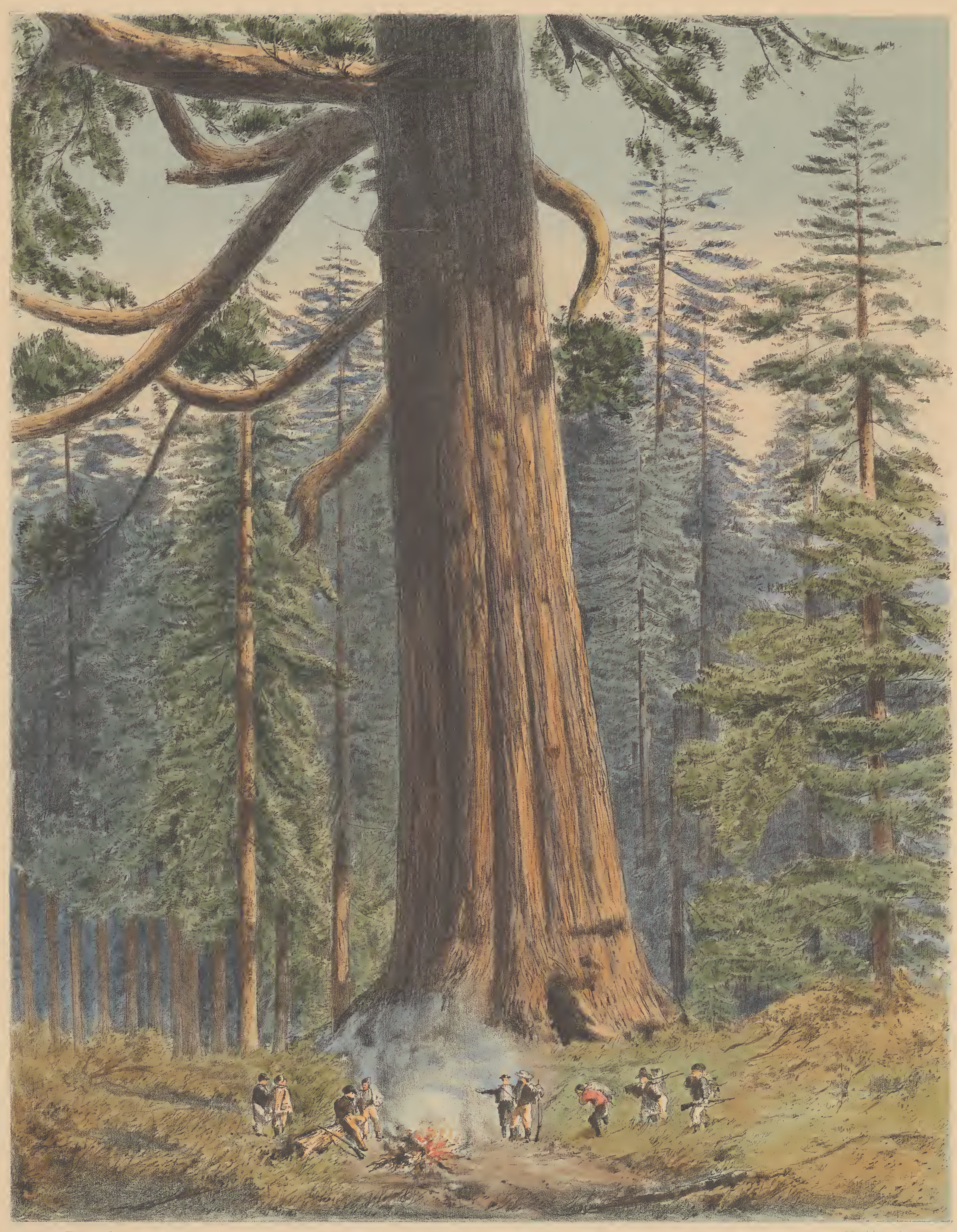


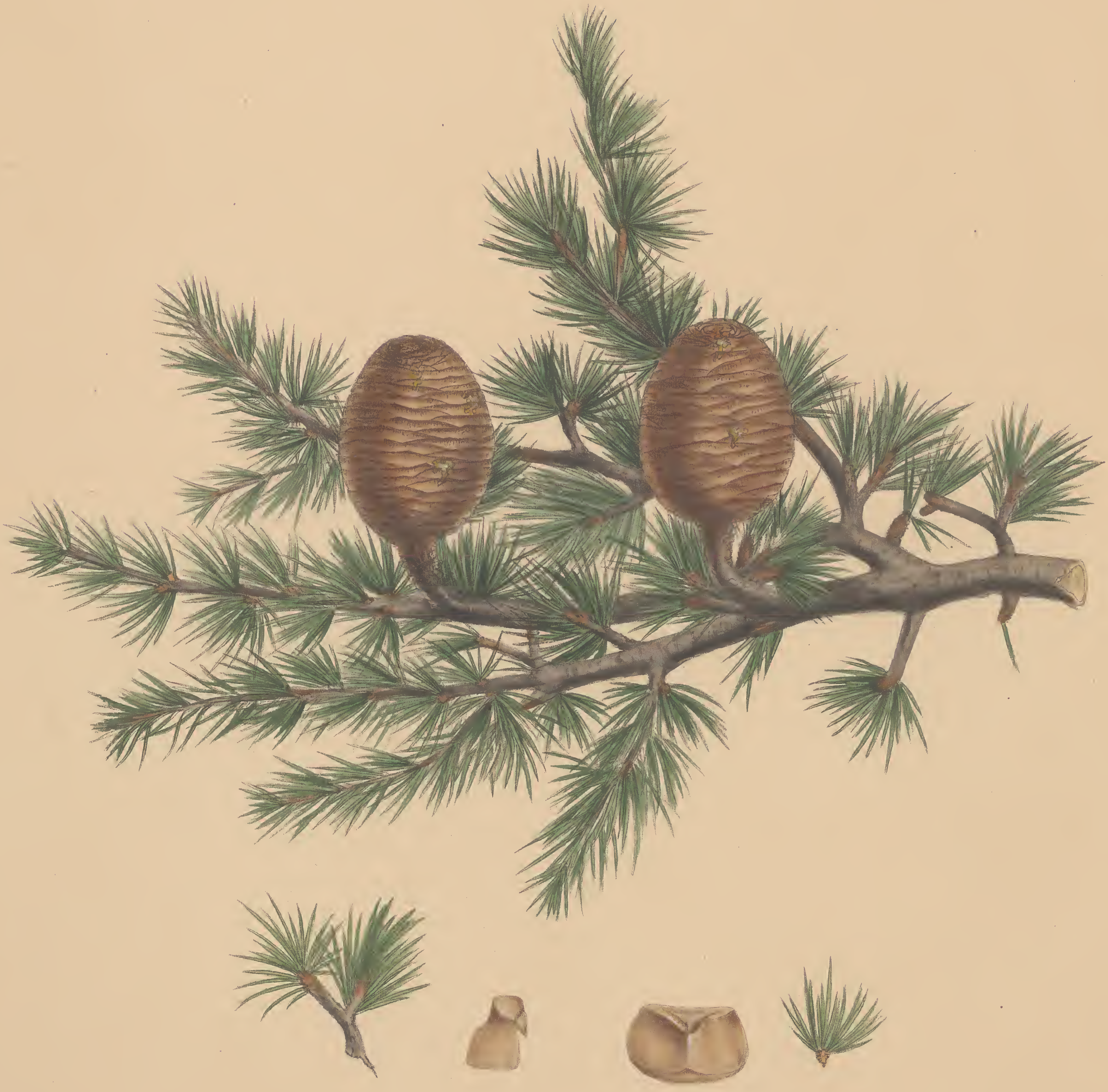
*From a Photograph*

[illegible] Exchange, Edin.

SEQUOIA WELLINGTONIA.

MARIPOSA GROVE, SOUTH CALIFORNIA.

LAWSON'S PINETUM BRITANNICUM.



Jas. Black. Del.

Jas. Black. Fec.

CEDRUS ATLANTICA. Manetti.

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# CEDRUS ATLANTICA.

Identification.—CEDRUS ATLANTICA, Manetti, *Cat. Horti Modic. Suppl.*, p. 9 (1844); Decaisne, in *Revue Hort.* 1853, p. 41; Carrière, *Traité Gén. des Conif.*, p. 285 (1855); Gordon, *Pinetum*, p. 39 (1858).
CEDRUS LIBANI, Var. Renou, *Annal. Forest.*, iii. p. 2 (1854); Cosson, *Annal. Science Nat.*, 4 ser., iv. p. 67 (1855), and v. p. 31 (1856).
CEDRUS AFRICANA, (Gordon) Knight, *Syn. Conif.*, p. 42 (1850).
CEDRUS ELEGANS, Knight, *Syn. Conif.*, p. 42 (1850).
PINUS ATLANTICA, Endlicher, *Syn. Conif.*, p. 137 (1847).
ABIES ATLANTICA, Lindl. & Gord., *Journ. Hort. Soc.*, v. p. 214 (1850).

Engravings.—*Cones and Leaves.*—Renou, *op. cit.*, pl. 1 and 2; Hooker, in *Nat. Hist. Rev.*, Jan. 1862, pl. 3.
*Trees.*—Article *Cedrus Deodara* in this work.

Var. CEDRUS ARGENTEA, Renou, *Annal. Forest.*, iii. p. 2 (1854).

*Specific Character.*—Cedrus ramis nec pendulis nec horizontalibus, foliis brevioribus crassioribus a Cedro Libani et Cedro Deodara diversa, conis minoribus et magis cylindricis, squamis triangularibus, seminibus alis oblique expansis.

Habitat in Monte Atlante.

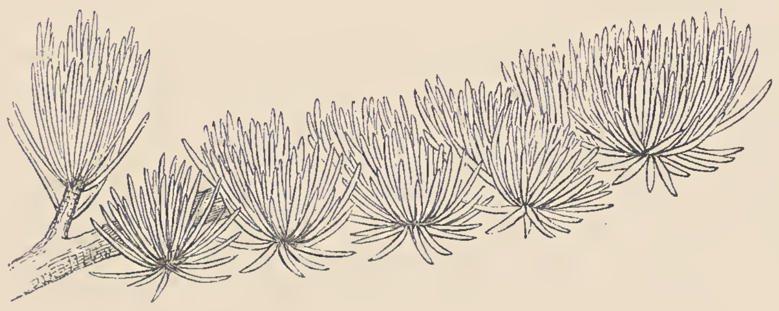

Fig. 1.

A tree of the size of the Cedar of Lebanon and Deodar, and scarcely distinguishable from it. The characters which have been given for distinguishing them are, that instead of its habit being tabuliform, as in the former, or with a drooping leader and branchlets, as in the latter, it has them rigid and erect, the ends of its branches being straight and stiff, instead of hanging more or less, as in both the other Cedars. The leaves are more glaucous, shorter, thicker, stiffer, and, consequently, more prickly than those of the other Cedars. Fig. 1 shews the usual size of the clusters of leaves. They have the same number of rows of stomata as those of the Cedar of Lebanon, viz., three on the two under sides, and two on the upper two [see figs. 2 and 3], both, of course, subject to variation and irregularities. The foliage is usually darker in colour, and more glaucous. There seems to be no perceptible difference in the male flowers. The cone is smaller and more cylindrical than that of the Cedar of Lebanon and Deodar, and is distinguished by a series of hollow dimples, much more marked than in the others. The group of cones in fig. 4 gives a good idea of its different forms and sizes. The middle-sized one may be taken as the typical example, but all four are common. They never reach the size of the cones of the Cedar or Deodar, and, so far as we have seen, they are never so much swollen or bellied out in the middle. These we have copied from a good collection of cones received from Mr Henry Vilmorin, of the well-known firm of Vilmorin, Andrieux, & Cie., of Paris, who, from his commerce in the seeds of this Cedar, is natur-

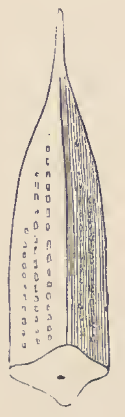

Fig. 2.

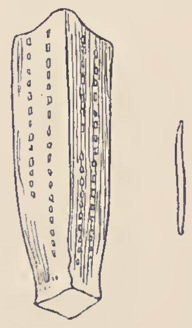

Fig. 3.

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ally very familiar with all forms of the cone. The largest of these he considers remarkably large; the middle-sized ones a fair average type of cones. He informs us that, although picked from many hundreds, both larger and smaller could be found. "A glance at them, however," says he, "will be enough to convince you that on an average they are much smaller than cones of *C. Libani;* and I consider this to be a fair and constant character to distinguish the two species. Instances may be adduced, of course, where cones of *C. Libani* are the smaller of the two, but such cases are exceptional, and cannot be depended upon. They are to be found, even in forests, much more different in size: I have seen, for instance, walnuts smaller than common hazel-nuts without my opinion of the relative size of the two being thereby affected in the least." The scales are smaller than those of the others, and triangular, instead of being somewhat quadrangular [figs. 5 and 6]. The seeds, figs. 7 and 8, are considerably shorter than, but shaped as those of the Deodar; that is, the wing slopes gradually from the seed on the outer edge. (See comparative sketch under the article Cedar of Lebanon.) In other respects we see no difference between this Cedar and the other two.

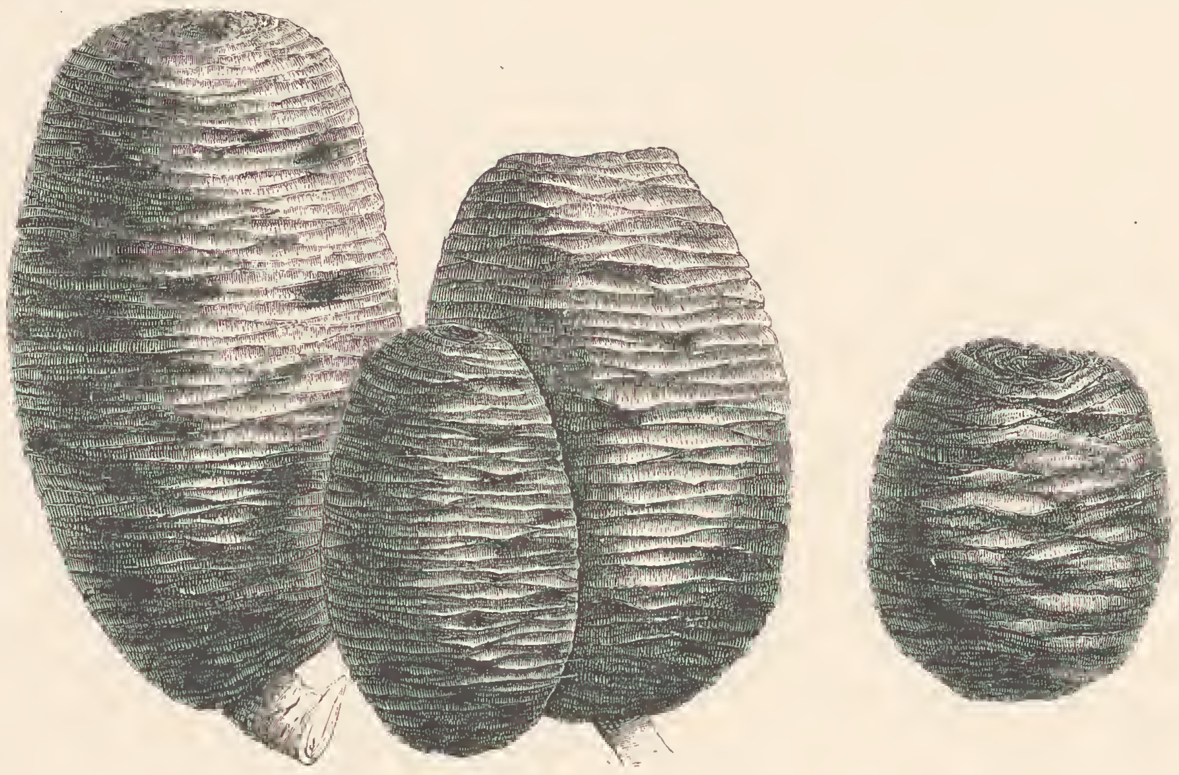

Fig. 4.
Group of Cones of Cedrus Atlantica.

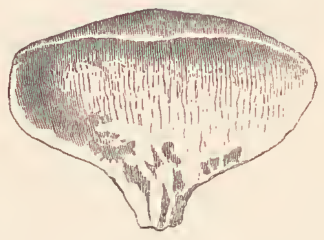

Fig. 5.

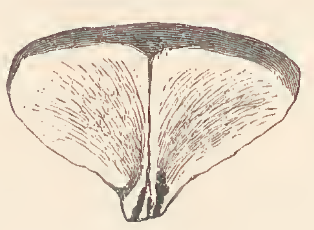

Fig. 6.

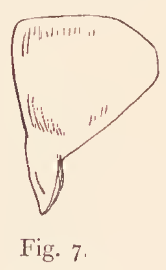

Fig. 7.

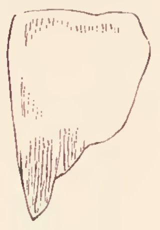

Fig. 8.

M. Cosson, who explored the botany of Algeria, and was familiar with the Cedar which grows there, unites, in his "Indications of Geographic Botany," the Cedar of Algeria and the Cedar of Lebanon, considering them to belong to the same species.

> "The Cedar of Algeria," says he, "only differs from the Cedar of Lebanon by its leaves being ordinarily shorter. As to the form and size of the cones, they furnish no distinctive character: for the Cedar of Algeria is only a variety of the Cedar of Lebanon, of which latter we have received authentic specimens from Lebanon and Taurus. Our view is confirmed by the opinion of Messrs Antoine and Kotschy, who equally refer the Cedar of Algeria to the Cedar of Lebanon, and we have seen specimens of that variety collected in the Taurus by MM. Kotschy and Balansa. The Cedar of Algeria appears under two forms: one, the most widely spread, is characterized by its shorter leaves generally arched, and almost connivent, and, above all, by their glaucous silvery hue (*Cedrus argentea*, Renou, *Annal. Forest.*, iii. pl. 2); the other is characterized by the leaves being a little longer, generally straight, divergent, and green (*Cedrus Libani*, var. Renou, *loc. cit.*, pl. 1). The study of the Cedars in the different forests of Algeria has brought us to consider the *C. Libani* and *argentea* of Renou as only modifications or sub-varieties due to local circumstances: in fact, generally, the young trees and the sheltered individuals have green and straight leaves; while the leaves, on the contrary, are glaucous and connivent in the adult trees, and those exposed to the influence of wind and heat. We ought to add that sometimes we have found the two kinds of leaves growing together on the same plant. Under the influence of the local conditions just mentioned, the Cedar presents itself under two very different aspects. During its youth, or in ravines, it often affects the pyramidal form, while on the slopes it more commonly crowns itself and spreads out like a pyramid. The *Pinus Halepensis*, which equally appears under these two states, and which, both in Algeria and in Lebanon and Taurus, is found growing next the Cedar, shews the little importance that ought to be attached to the circumstance." *

M. Decaisne, however, contends for the distinctness of *C. Atlantica* as a species; and in a paper in the *Revue Horticole*, 1853, quotes a letter from M. Jamin, Director of the Nursery of Biskra, in which he gives the following information:—

"M. P. Jamin

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* Cosson, "Rapport sur un Voyage Botanique en Algerie de Philipsville à Boskra, et dans les Monts Aures, entrepris en 1863, sous le patronage du Ministère de la Guerre," in *Annal. Science Nat.*, 4 ser., iv. p. 67.

> "M. P. Jamin, to whom I had applied for information concerning the Atlas Cedars, writes, under date of Dec. 18, 1852, that he has just returned from a journey of 18 days to Batna, Lambessa, and the Peak of Tongour, taken for the express purpose of obtaining information concerning the tree, and that he had visited carefully the latter locality in company with the keeper of the forests. He there found two species of Cedar. The peak on which they grow is about 1800 metres above the sandy soil which borders it. The more remarkable plants found at the foot of the mountain by M. Jamin were, as might have been anticipated, Mediterranean species. Cedars began to appear at three-quarters up the slope of Tongour, where they produce a magnificent effect, and form a thick forest up to the very summit of the peak. It is not uncommon to find specimens 40 metres high, and 1½ metres in diameter at the butt. The two species live together, but they are distinguished at first sight. The Silver Cedar (*C. Atlantica*) was covered with ripe cones; on that of Lebanon (*C. Africana*) they were more behind, and flowers were still visible on some of the branches. The habit of the Silver Cedar (*C. Atlantica*) is that of the Silver Fir; it is pyramidal, and its foliage is silvery; while that of the Cedar of Lebanon (*C. Africana*) is dark green, and its branches horizontal, as we all know. The number of trees is estimated at 20,000; the finest are on the northern face of the peak. M. Jamin saw many dead of old age or struck by lightning. While he was writing, the ground was covered two metres deep with snow; nevertheless, *Asphodelus albus* and *luteus*, *Ranunculus flabellatus*, violets, and a *Retama* (*Spartium monospermum*), were already in flower in sheltered places."

We are very much disposed to agree with M. Decaisne as to the distinctness of the Cedar of Lebanon from that of Algeria, and with M. Cosson as to the two forms found in the latter country being only varieties of the latter. Under the Cedar of Lebanon we have shewn why we think the Cedar in the Himmalayas should be more divergent from the original type than that of the Cedar of Algeria, which lives in a climate more similar to that of Lebanon. Still, even in the latter, the constant difference in the cones and seeds, as well as the habit, induces us to regard them as separate species. But we cannot go further, or reckon the two varieties of the Algerian Cedar as more than two different forms of the same thing. They are found growing together, and the young plants introduced into this country shew no appreciable difference.

A note relating to the Cedars of Mount Ciga inserted in the *Annales Forestieres* (1844, p. 1) informs us that one of the largest Cedars on that mountain was 29½ metres from the base to its first branches. Its trunk measured 1¾ metres in diameter at its base (nearly 15 feet in circumference), and 67 centimetres at its upper end.

*Geographical Distribution.*—This Cedar is confined to the north-east of Africa. It abounds on the Eastern Atlas range, and forms the prevalent arboreous vegetation throughout the eastern province of Constantine, which borders on Tunis; but we do not know whether or how far it extends westwards into the Greater Atlas, and into the kingdom of Morocco. It characterizes the upper mountain zone (5200 to 7200 feet), and approaches within twenty miles of the sea.

Although the occurrence of this Cedar in the Mount Atlas range has been long known, it was not until 1853 that the expedition of M. Jamin, and more especially of M. Cosson, gave us the reliable information which we now possess as to its range in the eastern part of Algeria.

It was in that year that M. Cosson made his botanical exploration through the greater part of Algeria, the results of which are published in the *Annales des Sciences Naturelles* for 1855. His explorations were confined to the province of Constantine and eastern part of the Atlas range, lying between 36° 53′ and 34° 40′ N. lat., and 3° 21′ and 4° 34′ E. long. of Paris, but regarding it he gives full details and a map of the localities, which we have reproduced in our Map Plate, in describing the Cedar of Lebanon, in so far as it relates to the Cedars. He divides the district into four regions: 1, The Mediterranean region; 2, the region of high plateaux; 3, the mountain region; and 4, the Sahara, or desert region. The mountain region again he divides into three principal zones: viz., 1, the lower zone; 2, the middle zone (which do not concern us); and 3, the upper zone. This zone is characterized above all by the forests of Cedars; its upper part, often treeless, recalls the characters of Alpine vegetation by the presence of perennial plants disposed in compact tufts. "The Cedar, which in the province of Constantine forms almost exclusively the forest vegetation of the upper mountain zone, occupies a surface of some thousands of hectares. It exists also in other parts of Algeria. It is met with in the chain of Djurdjura, but in these more abrupt mountains there are only some slopes favourable to its development. A forest of Cedars of a certain extent covers the upper part of the mountain of Ain Telazit above Blidah.

It is, above all, in the magnificent forest of Teniet-el-Haad that the Cedar attains the most considerable dimensions." (*Cosson*, op. cit., p. 67.)

In speaking of the vegetation of Djebel Tongour, M. Cosson says :—

"Towards the extremity of this plateau a band of rocks extends to the west, reaching almost to the peak (about 1800 metres in height), which offers us the *Linaria reflexa*, var. *lanigera* and several species characteristic of this new region of vegetation, among others the *Cotoneaster fontanessir*, and *nummularia*, which form some scattered clumps, and the *Draba Hispanica*, which carpets with its broad branches the ruggedness of the rocks; and near that some plants of *Cratægus monogyna*, var. *hirsuta*. After having turned the extremity of these rocks, and passed the last ravine which separates us from the base of the peak, we arrive at the limit of the forest of Cedars, at about 2030 metres in altitude, and still about 50 metres below the summit of the peak. On the slopes of the ridges which separate the principal faces, the Cedars, better sheltered from the violence of the winds, can attain an altitude still nearer the summit of the peak. It is probable that the summit and the abrupt crests are disfurnished with wood only through the rocky nature of the soil, the absence of vegetable mould, and the violence of the winds. On Djebel Tongour, as on other mountains covered with forests of Cedar, the tree, even towards the summit of the mountain, retains almost the same proportions as at its inferior limit of altitude. It is not so in the Alps, where the arborescent species diminish successively in size, and, at the extreme limit, are only represented by dwarfed shrubs." (*Cosson*, op. cit., p. 244.)

The inferior limit of the Cedar is determined, as we have already said, by the level of the valley itself (about 1620 metres in altitude). On no part of the northern face was there found either the trees or shrubs which constitute the woody vegetation of the lower part of the eastern face. The Cedar only shews itself at the base of the rocks which crown the summits, or in the upper part of the ravines of these strong centre-forts of the chain of the Djebel Bordjein.

"When we reach the fissure of the neck we see, losing themselves in the horizon, immense forests of Cedars covering all the slopes of the numerous mountains, which appear to lie in the direction of Setif. The presence or the abundance of the Cedar on the different faces, as well as the forms which it may present, have appeared to us to result from a concourse of circumstances, and to be submissive to laws of which the *exposé* will find its place better in the general considerations on the mountain region. We shall confine ourselves here to direct attention to the fact that the superficies occupied by the Cedar is much more extensive on the slopes facing the north than on the opposite slopes, where it generally only shews itself below the more elevated tops and in the upper parts of the deepest ravines.

"The forests of Djebel Tongour are estimated approximately at 1200 acres of Cedars, and 1500 of Evergreen Oak and other species. The vast forests which cover the numerous mountains of Bellesma, offer an extent of about 1800 acres of Evergreen Oaks, and 3000 acres of Cedars, which upon the northern faces reach the tops, and in the ravines prolong themselves to a distance of about six leagues. In one of these forests, a Cedar has been cut down nearly 45 metres in height, and of which the trunk, measured at one metre above the ground, gave 6.25 metres in circumference. The forest of Teniet-el-Haad, in the province of Algiers, which we have now visited, commonly presents Cedars of that circumference, and a considerable number of still more remarkable proportions. At about 5 leagues from Lambese, at Squaq, a forest of Cedars covers more than 3000 hectares." (*Cosson*, op. cit., p. 254.)

"To the south, the mountain of Ichemoul shews the upper part of its slopes, covered with trees of a pyramidal form, which our guides assure us to be Cedars. (*Cosson*, op. cit., vol. v. p. 31.)

"In the neighbourhood of the encampment of Ain Turck (Djebel Cheliah), and on the margin of the streams, stretch bare and woodless pastures, circumscribed by the wood of the lower part of the mountain, and by the forest of Cedars which occupies the slope above. At about 2150 metres of altitude, we arrive at the upper limit of the forest of Cedars, which terminates abruptly, as at Djebel Tongour, by Cedars as largely developed as those of the lower part. A narrow valley separates us from the base of the peak: the two slopes of that valley are equally covered with Cedars." (*Cosson*, op. cit., vol. v. p. 37.)

"The south slope of Djebel Cheliah is too abrupt and too disfurnished with vegetable mould to be regularly wooded. Thus the Cedars in general only occupy the ravines, and only reach a height much below that which they reach on the north slope. The greater number of them present characters of antiquity, and their summits have been broken by the wind or the fall of rocks. Several south slopes of elevated mountains which surround Djebel Cheliah, or which are its dependants, are, on the contrary, covered with Cedars almost to the summit. But these trees of which the tops generally are spread out like a parasol, do not present such a free development as those of the slopes turned towards the north." (*Cosson*, op. cit., vol. v. p. 38.)

The same denudation which we have to deplore in the case of the mountains of Lebanon, is threatening those of Algeria, although probably more slowly and by feebler instruments than worked the havoc in them. M. Cosson says on this head :—

"May we be permitted here to express our fears for the preservation of these magnificent forests of the Aurés. The numerous debris of the Cedars which marked the former limit of the forests, indicate that this limit has been already notably lowered through the depredations of the Arabs, who often, in the vicinity of their pastures or encampments, put fire to the foot of the forest trees. It is much to be desired that severe regulations should put a stop to these disorders in countries where the preservation of the arborescent vegetation is one of the indispensable conditions of the richness of the country; for the denudation of the soil and the falling of rocks would come to sterilise the valleys, and, in the end, bring deep trouble in the distribution of the waters, by converting the streams of water from a source of fertility into devastating torrents. To protect the forests in a more complete manner, the mutilation of trees should also be forbidden, to which the Arabs are only too prone; and the extraction of the resin, with the barking (to which the *P. Halepensis* is especially exposed), should be placed under proper regulations. The object cannot be attained, nevertheless, in the elevated mountains with rapid slopes, except by the absolute interdiction of the right of pasturage on the summits; for, by the destruction of young plants, and the oldness of the forest, which is the consequence, the flocks contribute much to lower the level of altitude reached by the arborescent vegetation. The rapidity of the growth of trees in hot climates will soon, besides, come to recompense the process of administration, as the forests of the neighbourhood of Batna, which have been submitted to forester control, and are in the way of repairing their losses, strikingly prove. In the report of our journey in the province of Ban, we have already called attention to the important results obtained in the environs of Saïda by the surveillance of military authority, for the amelioration of the woods which cover the northern reverse of the chasm which separates the Zell from the high plateaux. This example demonstrates that the military authority can, by an efficacious repression, obtain from the natives, without addition of expense, and without the organisation of a numerous staff, the strict observation of the measures necessary to prevent the diswooding of the country." (*Cosson*, op. cit., vol. v. p. 39.)

*History.*—The first notice which we have of this form of the Cedar is by Guiseppe Manetti, in his "Catalogus Plantarum Cæsarei Regii Horti prope Modiciam ad annum 1842." Modicia or Monza is situated only a few miles from Milan; and the Imperial Gardens of whose contents Manetti published this Catalogue, may be called the Botanical Gardens of Milan. Endlicher, in 1847, quoted Manetti's description, and recognised the African Cedar as a species, although that botanist's characters were not very sufficient. Decaisne adopted the species in 1853, in the paper above referred to; and since then it has been generally admitted. Nurserymen now give out the species under the names of *Cedrus Atlantica*, *C. Africana*, and *C. argentea;* but, according to our judgment, there is no more warrant for their doing this than there would be for them making two or more species of the varieties of the Cedar from Mount Lebanon itself.

M. Carrière says it was introduced about 1842, a statement doubtless resting on Manetti's publications, his catalogue having been published in 1842; but, as it is not noticed in the catalogue itself, but in the supplement, which was published in 1844, it ought rather to be referred to that year, or 1843. It was probably a year or two afterwards before it was generally introduced into Britain, that is to say, introduced knowingly and intentionally, as a distinct species. But that seeds may have been previously gathered in Algeria, and brought to Britain without suspicion that they were anything but the *Cedrus Libani*, seems very probable. There are in various places in England old trees which possess the character assigned to the Algerian form, and which, accordingly, are supposed to be specimens of, and have received the name of, *Cedrus Atlantica*. At Kew, the largest specimens labelled *Cedrus Atlantica* seem of an older date than Manetti's paper; and whether they are so or not, at least we are informed that the only warrant for the name assigned to them is their appearance and the character of their foliage, nothing being known of their origin. They have not yet borne fruit.

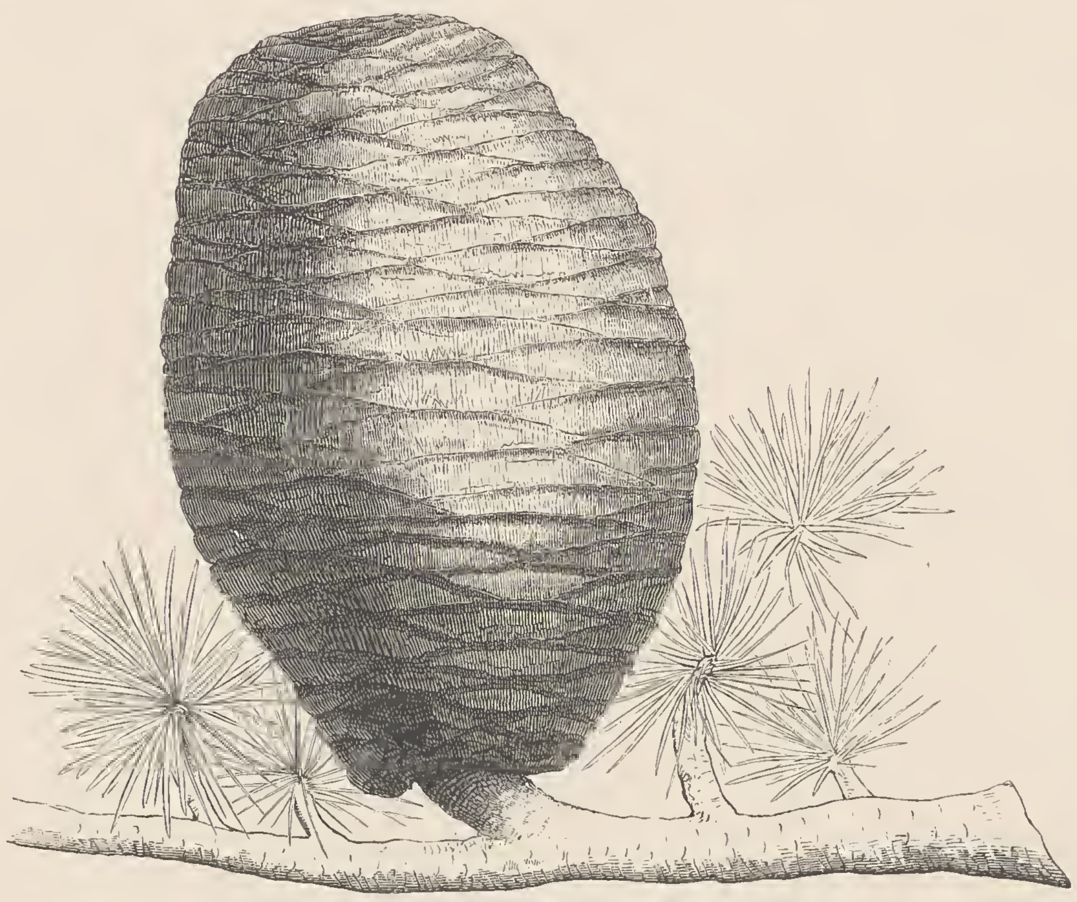
Fig. 9.—Cone of a Cedar of Lebanon at Easton Park, with the foliage and habit of, and erroneously supposed to be, *Cedrus Atlantica*.

There is a tree at Eastnor Castle, Herefordshire, which is 65 feet high, and upwards of 40 years of age, which was at one time thought to belong to this species; but which, we understand, on more advice, is now rather considered an exceptional specimen of the common *C. Libani.* There is another, upwards of a hundred years old, at Easton Park (a seat of the Duke of Hamilton's), in Suffolk, which was also thought by some to be entitled to the designation of *C. Atlantica*. It is peculiar in appearance, surpassing all the rest of the Cedars in beauty and effect, and has the habit and foliage of that Cedar. Mr Irving, the gardener there, tells us, on

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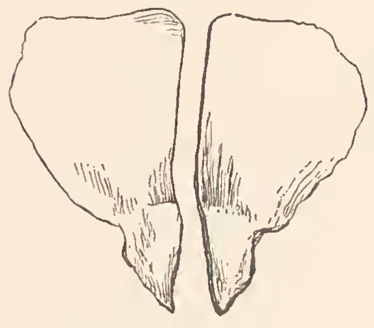
the authority of the agent, who had been there for fifty-three years, that the late Lord Rochford bought it at Norwich about a hundred years ago. He adds, "It is certainly a fine specimen, and quite distinct from *C. Libani.* We have other small plants of *C. Atlantica*, purchased from the London nurseries fourteen years ago, which are the same thing." Mr Irving has had the kindness to forward to us a twig and cone. The twig has all the characters of *C. Atlantica;* but the cone [fig. 9], which is very large and fine, corresponds in outward appearance with that of *C. Libani*, and not with that of *C. Atlantica*, which is smaller and more cylindrical. The wing of the seed, however, has a good deal of the character of that of *C. Atlantica*, although we find that sometimes, even in the same scale, a wing bearing somewhat of the characters of *C. Libani* is to be found alongside of one with the form of that of *C. Atlantica* [see figs. 10 and 11, which are from the same scale]. On the whole, we believe it to be only a variety of the Cedar of Lebanon.



Figs. 10 and 11.

*Properties and Uses.*—The occurrence of this tree on Mount Atlas was doubtless well known to the Romans, and it was probably of it that some of their choicest furniture was made.

Professor Alphonse De Candolle, writing in 1854, says :—

> "The *Citrus Atlantica*, of which were made the fine tables, *Mensa Citrea* of Africa, was probably the species of Cedar (*Cedrus Atlantica*) that we now know to exist in the Atlas. Such a confusion of names was very possible, since, even in our own age, when there are so great pretensions to know everything, we do not yet know from what tree comes the Palissandre, or Rosewood of Brazil, out of which an immense quantity of furniture is manufactured. The articles of the Dictionaries of Commerce are absurd on this point; and botanists have only obtained a little more exact information in 1853. Palissandre probably comes from the words, *palo santo*, holy wood. It appears that the tree is a leguminous tree of Brazil, of the genus *Machærium;* but the species is doubtful."—*Geographic Botanique Raisonnée*, vol. ii. p. 864 (1855).

In the Memoirs and Correspondence of Pepys, is a letter (quoted by Loudon, *Arboretum*, iv. Suppl., p. 2603) from Evelyn to Pepys, when the latter was at Tangiers, in which he makes the happy suggestion, "Were it not possible to discover whether any of those Citrine trees are yet to be found that of old grew about the foot of Mount Atlas, not far from Tingis? Now, for that some copies in Pliny read Cedria, others Citria, 'twould be inquired, What sort of Cedar (if any) grows about this mountain?" At what time the existence of the Cedar on Mount Atlas was first discovered does not appear. It was obviously not known when Evelyn wrote this, and it would be curious if its discovery had been due to his inquiry.

So far as regards its uses in modern times, they are confined to the ordinary applications of timber by the people of the country. Its value, however, may be expected to become better understood, and *Mensa Citrea* may once again perhaps be exported from the Atlas to be loaded with the dishes of the most civilized peoples of the world.

*Culture.*—This Cedar is perfectly hardy in Britain. Mr Palmer's tables of the results of the winter of 1860-61, report upon 74 places as follows :—

| | Killed. | Much injured. | Slightly Injured. | Uninjured. | Total. |
|---|---|---|---|---|---|
| England .............. | 4 | 1 | 8 | 38 | 51 |
| Scotland .............. | 1 | 1 | 10 | 7 | 19 |
| Ireland ................. | ... | ... | 1 | 3 | 4 |
| | 5 | 2 | 19 | 48 | 74 |

At one or two places the variety *C. Africana* is reported to have been more tender than the normal variety; for example, from Poles, in Herts, we have the following note: "The Mount Atlas variety of Cedar was browned; the *Cedrus Libani Africana* was much injured." But such instances we believe to have been merely accidental, arising from the constitution of the individual specimens. It has been exposed to another severe trial in the frost in January 1867. It stood this better than the Deodar, which, where unprotected by snow, was in many places killed or much browned. There was, however, one very important difference between the severe weather in 1860-61 and that in 1867. The former came at two times, and, although the second frost was not nearly so severe as the first, it killed a great many plants which had stood the first. Their lives had been spared, but their stamina was gone, and they were unable to stand a less severe and less protracted attack. In 1867 there was only one storm; and although the cold was in some places very great, so was the snow, and it consequently did comparatively little mischief.

The general experience seems to be that it is as hardy, and a more rapid grower, in our colder districts, than the Lebanon Cedar.

M. André Leroy, the well-known nurseryman of Angers, who has made a speciality of Conifers, speaks in very strong terms of the "immense advantages" which the Mount Atlas Cedar has in cultivation over the Cedar of Lebanon; and he considers that few species of Conifers, with the exception, perhaps, of the *Sequoia sempervirens* and *S. Wellingtonia*, grow faster than the *Cedrus Atlantica*. In a recent paper in the *Belgique Horticole* (p. 59, 1867) he gives a comparison of the rates of growth of it and the Cedar of Lebanon, both being under exactly the same conditions, which shews the following results:—

| CEDAR OF LEBANON. | | | CEDAR OF ATLAS. | |
|---|---|---|---|---|
| Age. | Height. | | Height. | |
| Years. | Metres. | Centimetres. | Metres. | Centimetres. |
| 1 | 0 | 6 to 8 | 0 | 10 to 15 |
| 2 | 0 | 12 „ 15 | 0 | 20 „ 30 |
| 3 | 0 | 18 „ 25 | 0 | 40 „ 50 |
| 4 | 0 | 30 | 1 | 0 |
| 5 | 0 | 50 | 1 | 75 |
| 6 | 0 | 75 | 2 | 50 |
| 7 | 1 | 0 | 3 and upwards. | |

shewing a growth of three times the rapidity in the first seven years.

Once arrived at the age of seven, he states the annual growth at often more than one metre; and, to give some idea of its vigour, he cites a tree planted at his place which, although only twelve years old (including the year of germination), is now one metre in circumference, which is equivalent to more than a foot in diameter.

M. Leroy remarks, too, that while at least as hardy as the Cedar of Lebanon, it is much less delicate. This is not a paradox, although it looks like one. It means that while both will stand the climate equally well, we may take liberties with the Cedar of Atlas in the way of transplanting, unfavourable position, soil, and exposure, which we could not take with the Cedar of Lebanon. It grows (so far as he has seen) equally well in all soils, and he believes that it will prove a most valuable forest tree for clothing barren and unprotected wastes on which nothing else will thrive. We must remember, however, that M. Leroy's experience relates to a rather more southern country and more genial climate than we possess in Britain.

We may note the following places as possessing good specimens of trees whose African parentage there is no reason to doubt, viz.:—

| Place. | County. | Height. | Age. | Place. | County. | Height. | Age. |
|---|---|---|---|---|---|---|---|
| | | Feet. | Years. | | | Feet. | Years. |
| Castle Martyr | Co. Cork | 38 | 18 | Enfield Chase | Middlesex | 18 | 10 |
| Norcliffe | Cheshire | 36 | 23 | Elvaston | Derbyshire | 17 | 14 |
| Bicton | Devonshire | 35 | 20 | Goodwood Park | Sussex | 17 | 7 |
| Eastnor Castle | Herefordshire | 31 | 21 | Carlowrie | Linlithgowshire | 17 | 18 |
| | | 28 | 21 | Windsor Castle | Berkshire | 16 | 10 |
| Bloxholme Hall | Lincolnshire | 30 | 23 | Welbeck Abbey | Nottinghamshire | 16 | 12 |
| Ashfield | Cheshire | 30 | 22 | Osborne | Isle of Wight | 15 | 18 |
| Ambleside | Westmoreland | 25 | 22 | Lambton Castle | Durham | 15 | 9 |
| Highnam Court | Gloucestershire | 25 | 20 | Redleaf | Kent | 15 | 17 |
| Holkar | Lancashire | 24 | 15 | Hafodunos | Derbyshire | 15 | 16 |
| Kew | Surrey | 24 | 14 | Wellington College | Berkshire | 6 | 10 |
| Tortworth | Gloucestershire | 21 | 14 | Harewood | Yorkshire | 5 | 10 |
| Donibristle | Fife | 20 | 16 | | | | |

Like most other Conifers, this tree suffers from wind. The tree at Ashfield, above noted, extends on the east side, where it is sheltered from cutting winds, 20 feet from the trunk over the spread of its branches; and on the west side, where it experiences the cutting effects of heavy gales, it only extends 10 feet. The slow growth of the trees at Wellington College, and at Harewood, in Yorkshire, is probably attributable to this cause.

At Eastnor Castle, Herefordshire, there are some fine young trees, of the variety called *Cedrus Atlantica argentea;* and there can be no doubt as to their being genuine descendants of the African species; for they were raised from cones gathered by Lord Somers himself in Temet el Haad, Mount Atlas, and planted in the year 1845. The height of the tallest in December 1860 was 18½ feet; in December 1861, 21 feet; in December 1862, 23 feet; and in December 1866, 31 feet; shewing almost as great a rapidity of growth as the Deodar.

*Commercial Statistics.*—In 1850 the price of 1-year seedlings was 2s. 6d., and 2-year 4s. each; while well-grown plants, from 12 to 18 inches, sold for 7s. 6d. each. In 1860, plants of 18 inches sold for 2s. each; 3 feet, 5s.; 4 to 6 feet, 7s. 6d. to 10s. 6d.; and from 8 to 10 feet, 21s. each. In 1867 the price of 2-year seedlings is 30s. per 100; plants from 9 to 12 inches, 50s. per 100; from 12 to 18 inches, 1s. to 2s. 6d. each; 2 to 4 feet, 2s. 6d. to 5s. each; and 4 to 6 feet, 7s. 6d. to 10s. 6d. each. In 1860 the price of a single cone was 1s.; in 1867 the price is 2s. per dozen; while clean seed sells for 2s. per ounce.

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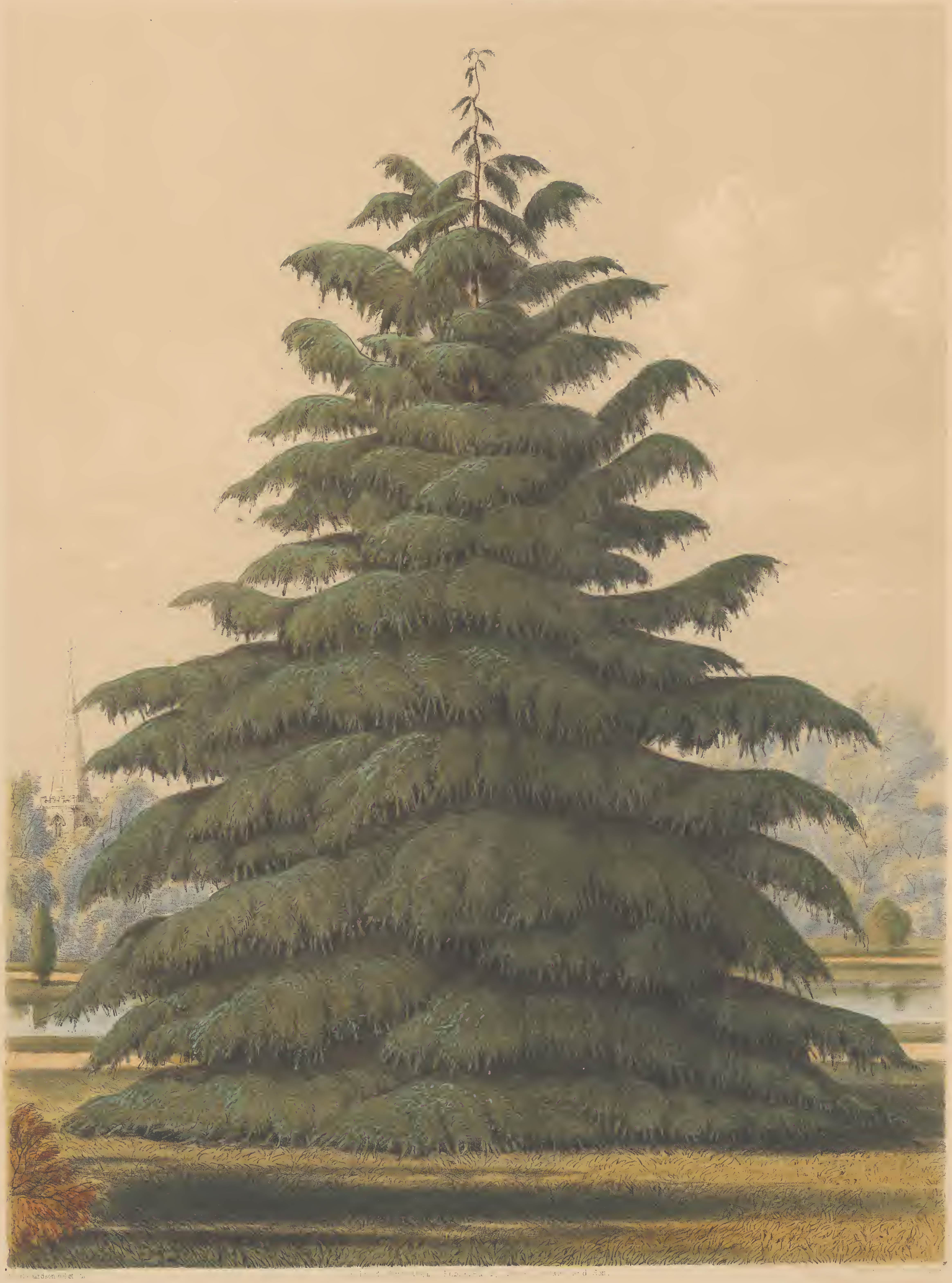

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CEDRUS DEODARA. Loudon.

# CEDRUS DEODARA.

IDENTIFICATION.—PINUS DEODARA, Lambert, *Genus Pinus*, ed. 1, ii. p. 8 (1824); ed. 2, ii. p. 93 (1828). Roxburgh, *Flor. Ind. Or.*, iii. p. 651 (1832). Antoine, *Conif.*, p. 59 (1840). Endlicher, *Syn. Conif.*, p. 135 (1847). Lawſon, *Abietinæ*, p. 22 (1851).

CEDRUS DEODARA, Lawſon, *Agric. Manual*, p. 381 (1836). Loudon, *Arboretum*, iv. p. 2428 (1838). Forbes, *Pinet. Woburn.*, p. 149 (1839). Link, in *Linnæa*, xv. p. 538 (1841). Spach, *Hiſt. Nat. Vég. Phaner.*, xi. p. 430 (1842). Hoffmeiſter, in *Bot. Zeit.*, p. 185 (1846). Madden, in the *Journ. of the Agric. and Hort. Soc. of India*, vii. p. 75 (1849-50); and in the *Journ. Hort. Soc.*, v. p. 250 (1850). Knight, *Syn. Conif.*, p. 42 (1850). Carrière, *Traité Gén. des Conif.*, p. 281 (1855). Gordon, *Pinetum*, p. 40 (1858); and *Supplement*, p. 19 (1862). Hooker, in *Nat. Hiſt. Rev.*, No. v. p. 16 (Jan. 1862).

CEDRUS INDICA, De Chambray, *Traité Prat. Arb. Rés. Conif.*, p. 341 (1845).

ABIES DEODARA, Lindley, in *Penny Cyclop.*, p. 9 (1833). Lindley and Gordon, in *Journ. Hort. Soc.*, v. p. 214 (1850.)

| | |
|---|---|
| DEODAROO or DEVA-DARU of the Shaſtras. | Indian Names. |
| DIYAR of the Khuiſyas. | |
| DEEWAR of the Gorkalees. | |
| KELON-KEOOL-KALEE, KELTOO of Buſehur and N.W. Gurhwal. | |
| KELMUNG or KJELMANG of Konnawur. | |

ENGRAVINGS.—*Cone, Leaves, &c.*, Lambert, *Genus Pinus*, ed. 1, t. S. N.; ed. 2, t. 52. Antoine, *Conif.*, t. 22, fig. 2. Loudon, *Arboretum*, iv., figs. 2283, 2284, 2286. Forbes, *Pinet. Woburn.*, t. 48-49. Hooker, *Nat. Hiſt. Rev.*, p. 16 for Jan. 1862.

*Tree*, Lambert, *Genus Pinus*, ed. 2, t. 52 a. Loudon, *Arboretum*, iv. fig. 2285.

*Specific Character.*—Cedrus ramis pendulis, foliis patentibus laxiuſculis, ſtrobilis ſquamis baſi haud inflexis, ſeminibus alis, ſubito expanſis.

Habitat in Montibus Himmalayaicis.

A large horizontally-branched tree, with its leader and young branchlets pendulous or drooping; the bark brown, with a whitiſh luſtre. Branchlets ſomewhat tuberculoſe from the perſiſtent baſes of the faſciculi of leaves. Leaves growing on the branches in tufts, which are compoſed of from twenty to ſixty in number. On the younger twigs they do not grow in tufts, but ſolitary. Each tuft may be called an arreſted bud; and this accounts for the readineſs with which, when the leader is nipped by froſt, or otherwiſe hurt, it is replaced by another ſtarting from the next bud immediately behind the portion of the leader which is deſtroyed. They are light-green and glaucous when young, leſs glaucous and darker green as they become older. They are triquetral (the midrib being prominent on the inner ſide and rounded on the back), ſtiff, perennial, from half an inch to two inches in length, acicular acute. There are about four rows of ſtomata on each ſide of the midrib of the inner ſide, and one or two lines of ſtomata, or ſometimes only a few irregular ſcattered ſtomata, on the rounded outer ſide [figs. 1, 2, and 3]. The male catkins are numerous, ſolitary at firſt, oblong, oval, and obtuſe, afterwards more cylindrical. The ſtamens are ſub-cylindrical, bilocular, and with a triangular terminal oblique ſcale [figs. 4 and 5]. The female cones are at firſt ſeſſile, ſolitary, of a cylindrical form, of a pea-green colour, covered with a delicate velvety bluiſh bloom. As they advance in growth, they ſtand erect and ſolitary on a ſmall peduncle on the upper ſide of the branches, and become brown. They are oval, very obtuſe, from two to five inches in length, and from one to two and a half inches in diameter. In their early green ſtage they have a moſt

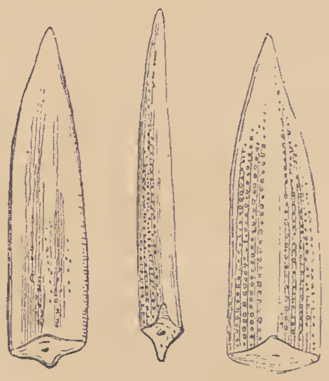
Fig. 1. Fig. 2. Fig. 3.
Magnified.

delicious fragrance. The ſcales are very broad, tranſverſely oblong, flat, fan-ſhaped, ferruginous, entire, ſmooth, and thin at the edges, and ſomewhat membranaceous in texture [figs. 6 and 7]. Seeds unequal, ſomewhat wedge-ſhaped, with a large obovate membranous brown wing, expanding ſuddenly on the thinner ſide, immediately beyond the ſeed [fig. 8]. Mr Gordon ſays that the majority of the male catkins and the female flowers are produced on ſeparate trees, but that a conſiderable number of trees alſo produce both male and female flowers on the ſame individual.

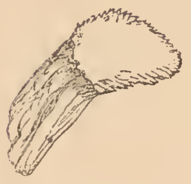
Fig. 4.

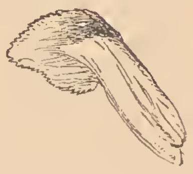
Fig. 5.

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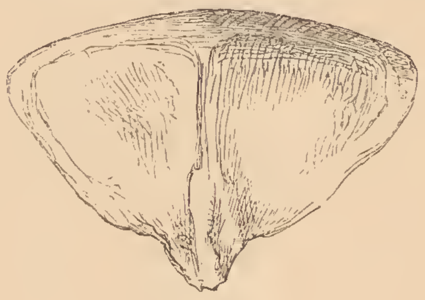
Fig. 6.

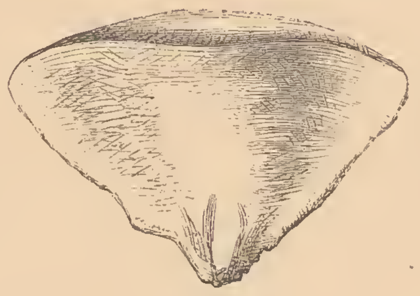
Fig. 7.

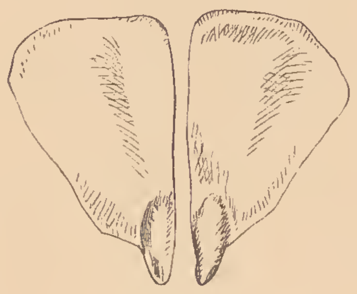
Fig. 8.

*Deſcription.*—The tree in its native habitat is deſcribed as of enormous ſize, ſheeting the ſides of the mountains with a perennial coat of verdure. It is ſaid to be by no means unuſual, in favourable ſituations, to ſee it "with a girth varying from 24 to 30 feet, with a proportionate height and expanſe of branches. Several have been meaſured 33 and 36 feet in circumference at 4 or 5 feet from the ground, and others have been calculated to be 160, 180, or even 200 feet in height." Nothing can exceed the grandeur of an old Deodar of 30 feet girth; nor can any adequate conception be formed of its majeſtic character from the ſmall ſpecimens now in exiſtence in England. It varies in appearance greatly during its growth. The young tree riſes in an elongated conical maſs, tapering off into a long leading ſhoot. When it attains a height of 50 or 60 feet, the terminal leader is ſaid to wither, the top to become flattened, the lateral growth increaſed, and the tree is ſaid by ſome to drop the character of the Larch, and to put on that of the Cedar. That its appearance certainly alters greatly may be inferred from the circumſtance that the Engliſh reſidents in the hill-ſtations like Simla imagine that there are two ſpecies: the old tree which they call the Deodar, and the younger one the Kelon. The branches come off cloſe to the ground, ſpreading out in horizontal expanſions, riſing flight above flight, in ſucceſſive ſheeted ſteps, into a rounded or ſlightly flattened top. The ſlighteſt trace of decay is ſeldom or never ſeen in the trunk; and the tree, except where growing in very expoſed ſituations, never puts on the depreſſed tabulated character of the Cedar of Lebanon. The Larch-like form, however, muſt ſubſiſt alſo for a long period, for it is ſaid, on the authority of Mr Acworth (*Gard. Chron.*, 25th Feb. 1854), that he found the old trees in Lebanon gnarled like our own old foreſt trees, while the foreſts of Deodar which he had viſited in India reminded him of a maſs of gigantic Larches.

Mr Fortune ſtates that in the Himmalayahs he could detect no difference in the habits of old trees of the Deodar and the Cedar of Lebanon, the branches, with the exception of the young terminal twigs, being ſtrictly horizontal; and that as old trees produce very ſhort growths of young wood, the pendulous habit is ſcarcely obſervable.

A foreſt of Deodars exiſted ſome years ago, and probably ſtill exiſts, about ſix miles from Fargoo, on the way to the Borinda Paſs. Moſt of the trees were 150 feet high, "as round and taper as a billiard-cue," and from 15 to 18 feet in circumference, without a ſingle ſide-branch until within a few feet of the top. Another foreſt, near the Choor Mountain, is deſcribed as containing ſome moſt magnificent Deodars of great ſize: thouſands there ſtanding together 200 feet high and 20 to 25 or even 30 feet in girth. The enormous trunks of the trees which had fallen, and which were as high as a man's head, formed a troubleſome obſtacle to the traveller's progreſs.

It has been obſerved, in its growth in this country, that the lateral branches do not attain the horizontal poſition until they are three years old, and that the pendent top, changing its direction every year, makes a complete revolution in three years, and ſo aſcends like a ſcrew.

It will be ſeen, by comparing the above characters and deſcription with thoſe of the Cedar of Lebanon and *Cedrus Atlantica*, that the differences between them are not great. This has given riſe to much diſcuſſion among ſcientific men as to whether they are mere varieties of the ſame ſpecies, or three true and diſtinct ſpecies. Major Hodgſon, when ſurveying the Himmalayahs, firſt promulgated the idea that they were the ſame, and Captain A. Gerard adopted his views. The grounds on which they have been conſidered independent ſpecies have hitherto been mainly their habit and manner of growth. There are, however, or have been ſuppoſed to be, ſome differences in the botanical characters, ſuch as the form of the leaves, cones, ſcales, and ſeeds, in the degree of perſiſtence of the cones, the different quality of the timber, and the odour of the wood and leaves, &c., which cannot be paſſed over without conſideration.

We ſhall examine all theſe differences, whether of habit or character, ſeriatim, and endeavour to weigh the importance that ſhould be attached to each.

In the firſt place, undoubtedly, the greateſt difference which can be pointed out is in the habit of growth.

Difference in the habit of growth.

In the Cedar of Lebanon, the leading ſhoot in young trees is ſtiff, often inclined to one ſide, but not pendulous; when older, it becomes firſt ſpiry, and afterward the tree aſſumes a more or leſs tabulated form, the branches being ſpread out in horizontal layers or ſtages, with the ends of the branches drooping more or leſs.

The African Cedar has a perfectly erect rigid leader, and ſtraight ſtiff ends to the branches, not drooping, as in the Cedar of Lebanon.

The Deodar, on the other hand, has a very pendulous leader, and much more drooping ends to its branches;* afterwards, it acquires a rounded top and horizontal branches, as already mentioned.

All, however, are very variable in habit and appearance; and, what is more extraordinary, inſtances occur where ſpecial and exceptional treatment has changed the habit from that of one tree into that of the other. A Deodar may be ſeen at Chatſworth, of which the one-half appears to be a Deodar, and the other half a Cedar of Lebanon. When young, the half of a main branch happened to be broken off, and all the branchlets and branches which afterwards grew from that broken branch aſſumed the ſtiff, flat port of the Cedar, while the reſt of the tree continued unchanged, and wholly Deodar. That it ſhould have done ſo ſeems in accordance with phyſiological principles. The pruning which this branch had ſuffered cauſed it to receive a greater proportion of ſap than it could naturally diſpoſe of, and conſequently made it more vigorous. The effect of greater vigour would be to raiſe the drooping twigs, and ſo give the Deodar the appearance of a Cedar. The change, however, was confined to that branch; but it proved permanent on it, and continued to grow with its growth. What may be called congenital varieties are alſo common; ſo much ſo, that in the caſe of the Deodar there are five diſtinct varieties known to nurſerymen—ſome as ſtiff, others as dark-coloured, and others as ſhort-leaved as the Cedar of Lebanon. But with all that, the habit remains ſo diſtinct that it is ſcarcely poſſible to miſtake the one for the other. No one, we believe, ever ſaw a Cedar of Lebanon with its ſeedling ſtem turned downwards; no one a Deodar in any other ſtate.

The late Mr Robert Glendinning ſays—"I can ſhew any one thouſands of each of the kinds growing near one another, of from one to nine years' growth, all of them having been raiſed from ſeeds on the ſame ſpot; and I will venture to affirm that no botanical or gardening knowledge is required to diſtinguiſh them; or I will take at random one hundred of each, three feet high, promiſcuouſly, and mix them, and I will guarantee that any bricklayer's labourer will ſeparate them without any error. They are as eaſily ſeparated in the ſeedling ſtate as at four feet high" (*Gard. Chron.*, 5th March 1853).

Another writer ſays—"Sow any number of millions of ſeeds of the Deodar, and the ſame number of the Cedar, mix the plants together, and after many years' growth no gardener would have the ſlighteſt difficulty in ſeparating the two kinds" (*Gard. Chron.*, 19th Feb. 1853).

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* Mr Glendinning (*Gard. Chron., loc. cit. infra*) aſks—"Has any one yet attempted to give any explanation why the young plants of the *Abies Smithiana*, *Pinus excelſa*, *Gerardiana*, *Abies Brunoniana*, and *Cupreſſus toruloſa*, and other conifers from the Himmalayahs, turn their heads down more than thoſe neareſt allied to them from other parts of the world? Has the climate of the Himmalayahs any effect of this kind on the growth of theſe conifers?"

Nor is the difference loſt as the tree advances in years. It becomes more horizontal and tabulated, but ſtill ſomewhat rounded, and never, unleſs in exceptional caſes, ſo truncated as the Cedar of Lebanon. But what is the value of theſe differences: to what do they amount? It is a difference in phyſical conſtitution, and not in ſtructure or form. And we apprehend that, although variations in this reſpect may be admitted as a *prima facie* indication that ſpecific differences exiſt, yet they are in themſelves no proof of ſuch difference; and if a minute compariſon of two ſuppoſed ſpecies fails to ſhew any peculiarities of ſtructure, mere ſize of parts and mode of growth cannot of themſelves conſtitute a diſtinct ſpecies.

Difference in hardineſs.

The three Cedars have three different degrees of hardineſs. Mr Glendinning (*loc. cit. ſupra*) ſays—"There is, however, another important fact, of which I have endleſs proof, bearing materially on the queſtion at iſſue. Six years ago I ſent a few plants of *C. Atlantica* to Scotland: they got diſtributed, ſome on the eaſtern and weſtern coaſts, others in the interior. At that time it was called *C. Africana:* the very name, in ſpite of my aſſertion to the contrary, induced every perſon to look upon it as tender. It has turned out that, when planted with the Lebanon and Deodar, the Lebanon is ſtunted and makes no headway; the Deodar gets ſcorched, and often loſes parts of its branches and foliage; whereas the *Atlantica* neither becomes injured nor ſtands ſtill, but grows away moſt vigorouſly." This ſtatement is fully confirmed by ſubſequent experience, more eſpecially by that of the ſevere winter of 1860-61. An admirable digeſt of the effects of that winter has been made by Mr Charles Palmer of Mancheſter, a young enthuſiaſt in conifers, who has accumulated, with great pains and trouble, a large amount of information on the ſubject from every part of the kingdom. The details which he thus brought together he has tabulated with great clearneſs; and with rare liberality has placed the reſults of his labours (contained in three thick folio ledgers) at our diſpoſal for this work. Our readers will often profit by his materials. From his tables it appears that out of the inſtances reported to him, the relative proportions of deaths and ſevere injuries, as againſt total eſcape and ſlight injury, in the caſe of the three Cedars, were as follows:—

"One in 2½ killed or ſeverely injured in *C. Deodara.*
" 7½ " " " *C. Libani.*
" 10½ " " " *C. Atlantica.*"

It is to be noted that theſe proportions are not to be taken as giving any abſolute reſults. They are merely of uſe as relative reſults, for they repreſent an average of thoſe data only which Mr Palmer could pick up. But as all were taken impartially, and without ſelection, the value of the relative reſults remains unaffected.

Mr Glendinning concludes the paſſage above quoted by aſking—"Now I ſhould like to aſk one queſtion of botaniſts—viz., Can plants of one ſpecies ſuſtain (all circumſtances being the ſame) different degrees of temperature?" We ſhould imagine that no one can doubt it. It is in the vegetable kingdom as in the animal. In every ſpecies in the animal kingdom there are ſome members hardier than others: witneſs the differences in this reſpect in the human race, nay, in every man's own family. So in the vegetable kingdom: no two peas ſown out of the ſame pod will have the ſame degree of hardineſs. And Mr Palmer's tables furniſh a ſtriking illuſtration of the fact in the very ſubject before us, as it appears utterly fatal to the idea that any value can be put upon phyſical conſtitution *alone* as a ſpecific character. Of the nurſerymen's varieties of *C. Deodara,* Mr Palmer's reports ſhew that in the caſe of the two extreme varieties one in two of the *Var. viridis* were killed, while in the *Var. robuſta* only one in ſix were ſo.

Difference in the leaves.

In the Cedar of Lebanon the leaves are of a middle ſize, between the *Cedrus Atlantica* and the Deodar; they are alſo lighter in colour, of a greener hue, and thinner than either. The *Cedrus Atlantica* has them ſhorter, more glaucous, of a darker green, and ſharper than thoſe of the other two. In the Deodar they are longer than in either of the others, and darker green and more glaucous than thoſe of *C. Libani,* but not of ſo dark a green or ſo ſilvery as thoſe of *C. Atlantica.* The point of the leaf in *C. Atlantica* is nearly equally pointed on both ſides. In the Cedar of Lebanon it is bevelled off from behind, that is, from the rounded ſide. The greater or leſs ſilverineſs or glaucous hue (although not the darker or lighter colour of the leaf) is due, in a great meaſure, to the number of ſilvery ſtomata on the leaf. If the number of ſtomata were conſtant and well defined in the three kinds, we ſhould reckon it a good botanical diſtinction. Where it is tolerably conſtant and defined, it is a moſt uſeful one; but here, like ſo many of the other characters of the Cedar, it is too variable to be much relied on. If we examine with a lens a random-plucked leaf of the Cedar of Lebanon, we ſhall moſt probably find that on the rounded back of the leaf there are at moſt two or three widely ſeparated rows of ſtomata, and on each ſide of the midrib of the inner ſide we ſhall find two or three rows of ſtomata; while in *Cedrus Atlantica* we find the ſtomata larger and more diſtinct, and three or four rows on each ſide of the midrib, and as many but more irregular rows on the back. In the Deodar we ſhould find from four to ſix rows of ſtomata on each ſide of the midrib, and on the back one or two rows, or perhaps only a few ſcattered irregular ſtomata towards the middle, and theſe broader, leſs defined, uſually without the ſilvery mealineſs peculiar to the ſtomata of the fir tribe. The back in the Deodar ſeems more ſubject to depreſſions, cauſed by half-effaced ſtomata, than the others. The next leaf plucked might give the ſame reſults; but after having examined ſeveral taken from different parts of the tree, we ſhould find that the formula no longer ran true. The *C. Atlantica*, however, can generally be recogniſed by the ſhortneſs of its leaves; ſo that four rows of ſtomata on its leaf have proportionably more effect than five on that of the Deodar; beſides, the contraſt from the darker green of the leaf makes the ſilverineſs more apparent.

At one time it was maintained that there was a difference in the form of the leaf when cut in ſection, the leaves of one ſpecies being triquetral, thoſe of another being boat-ſhaped, and of the third quadrangular. This was a pure miſtake, ariſing from the obſervation having been made upon dried or freſh ſpecimens, where the leaves had or had not ſhrunk into abnormal forms. They are all alike in ſection, although they differ conſiderably in length and breadth.

Difference in the cone.

The cone of the African ſpecies is ſmaller than that of either thoſe of *C. Libani* or *C. Deodara*: theſe are about equal in ſize. The form of the Deodar cone is perhaps a little more oblate than that of the others, but the difference is certainly very ſlight. Fig. 9 ſhews the relative form of all three; the plain line indicates that of *C. Libani*, the ſhaded line that of *C. Deodara*, and the dotted line that of *C. Atlantica*. Theſe outlines are copied from the figures publiſhed by Dr Hooker (*Natural Hiſtory Review* for Jan. 1862), as the moſt characteriſtic he could find of the different ſpecies; but there would, we think, be no difficulty in picking out ſpecimens of all three which ſhould fit the ſame profile.

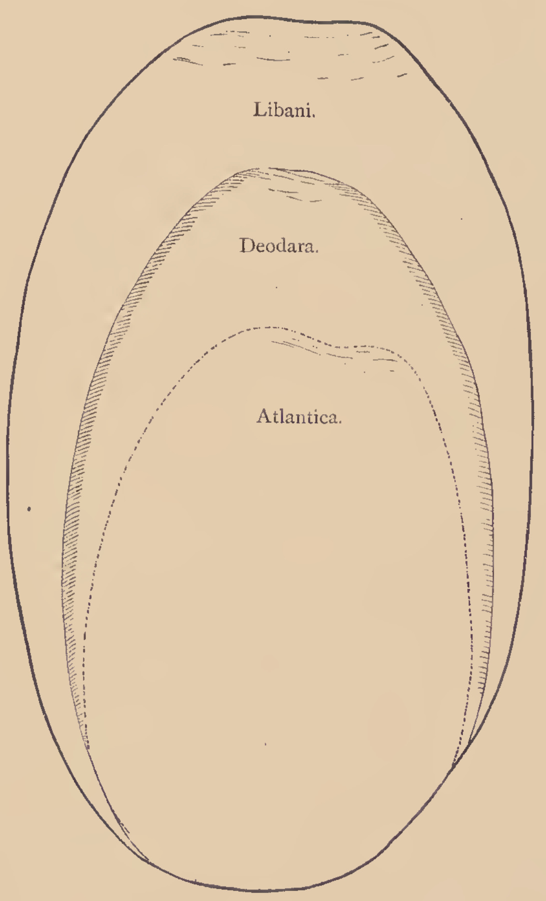

Fig. 9.

Difference in the perſiſtence of the scales of the cone.

This was a ſpecific character formerly much relied upon. It was thought that the ſcales of the Cedar of Lebanon never ſeparated ſpontaneouſly from the axis, while thoſe of the Deodar did ſo readily. This is a miſtake into which many men of eminence fell from want of ſufficient materials and information. They received cones of the *C. Libani* from Lebanon, and theſe were ſo hard and ſo perſiſtent, that mechanical means had to be contrived for breaking up the cone. Lambert ſays—"The following is the beſt mode of extracting them (the ſeeds) from the cones: let a hole be bored with a gimlet exactly through the middle of each cone from the baſe to the apex. Put them in a tub of water, in which they remain until next day, then let a wooden peg, rather bigger than the gimlet, be thruſt into the hole, and it will ſo divide the cones that the different ſcales may be taken away and the ſeeds picked out."—(*Genus Pinus*, ii. 90.) Somewhat ſimilar inſtructions are given by M. Loiſeleur Deſlongchamps, with a little more detail, ſuch as ſawing off the baſe of the cone, putting the cones in a vice, &c. Had Mr Lambert or M. Deſlongchamps lived near a grove of old Cedars, they would not have fallen into this error. They would have found that the whole of the ſcales and ſeeds drop from the axis (as in any other *Picea*) when nature is ready for the operation. If plucked before ſhe is ready, they are perſiſtent to the laſt degree, and require all the machinery recommended by Mr Lambert. If we wait until ſpring, when the ground is ready to receive the ſeed, the cone has by that time fallen to pieces of its own accord.

The diſcovery of the error of the older botaniſts on this point has, we imagine, led their ſucceſſors to aſſume, that as the cones of all Cedars are now known to be not perſiſtent, the diſtinction taken by their predeceſſors as to the breaking up or not of the cones is of no value at all. We are not prepared to go ſo far. The Deodar has now begun to fruit in this country, and it has been found that its ſcales are much leſs perſiſtent than thoſe of *Libani.* Specimens pulled ſo green as even to have their unchanged colour and bloom upon them, can ſcarcely be kept from falling to pieces unleſs tied up or netted.

Difference in the form of the ſcales of the cone.

As in the other organs, deceptive ſcales may be eaſily picked out; but the normal form of the Deodar at leaſt is diſtinct from thoſe of the other two. The following outlines (fig. 10), copied from Dr Hooker's paper, already referred to, contraſt the form of the ſcales of all three: the ſmooth line being that of the Cedar of Lebanon, the ſhaded line that of the Deodar, and the dotted line that of the African Cedar. The difference ſeems to us of ſome value as a ſpecific character. It will be obſerved, however, that the difference is not between all of them, but only between the Deodar and the other two. It muſt alſo be obſerved, that the differences here ſpoken of are actual differences in the form of the ſcales, not the difference given by Endlicher as ſpecific diſtinctions, viz., that the ſcale of the one is bent in near the baſe almoſt at right angles, while that of the other is flat. His words are, "Strobili ſquamis baſi, ſub angulo recto inflexis," and, "Strobili ſquamis baſi haud inflexis." On this diſtinction, Dr Lindley ſays that this difference ſeems to have no real exiſtence, or rather to depend on the age of the cone; for before maturity the ſcales are cloſely preſſed together and bent upwards, but as the ſeed ripens they ſpread out and become ſtraight, or even reflexed, before they fall away from the perſiſtent cones. So far as we have ſeen, however, the bend referred to is the normal form of ſcale in the Cedar of Lebanon, while it is not ſo in the Deodar.

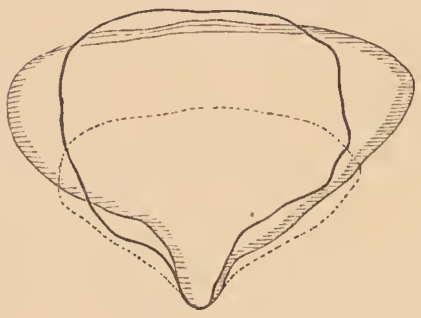
Fig. 10.

Difference in the ſeeds.

The chief difference here lies in the form of the wings of the ſeeds. Theſe are reſpectively contraſted in fig. 11, by the plain, shaded, and dotted lines, as has been done above with the cone and ſcales. Here again the difference is not between all three, but only between the Deodar and the other two. The difference is perhaps of as great ſpecific value as any of the others, the gradual or ſudden expanſion of the wing of the ſeed being a character which has been found uſeful in diſcriminating other allied ſpecies; as, for example, the different ſpecies of the Silver Firs of Greece, *Picea Cephalonica*, *P. Apollinis*, &c. Seeds of the Deodar loſe their vitality much ſooner than thoſe of *Atlantica.* Thoſe brought from India, unleſs ſent home with the utmoſt deſpatch when gathered, will vegetate ſparingly and weakly. On the other hand, ſeeds of *Atlantica* will vegetate pretty freely although kept over a year.

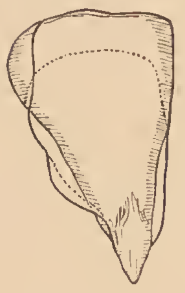
Fig. 11.

Difference in the odour.

The odour given out by plants, although ſo evaneſcent, unſeizable, and impoſſible to be deſcribed, is by no means to be deſpiſed as a character, eſpecially in conifers, where we require every help which we can find, and where, moreover, the odour is uſually very marked. Almoſt every ſpecies has a different fragrance, and any one who has paid attention to the ſubject could, from that alone, diſtinguiſh many of the ſpecies. This is moſt marked in thoſe ſpecies which have a large amount of reſin in their veins (ſo to ſpeak), and more eſpecially in their ſeeds or ſeed-veſſels, as *Piceas*, Cypreſſes, &c. The odour is different in different parts, and ſhews itſelf in different ways. The general odour is diſtinct from that given out by the different parts. Who can enter a foreſt of Scotch Fir or Spruce without rejoicing in the delightful ſmell? The fragrance of a journey through a wood of *Pinus Cembra* in Switzerland lingers in the memory ever after. As regards this general diffuſion of the breath of the Cedars, there is not much to be ſaid: ſo far as can be learned in Europe, little or nothing. We have old groves of Cedar of Lebanon and young groves of the Deodar, but neither of theſe of ſuch extent as

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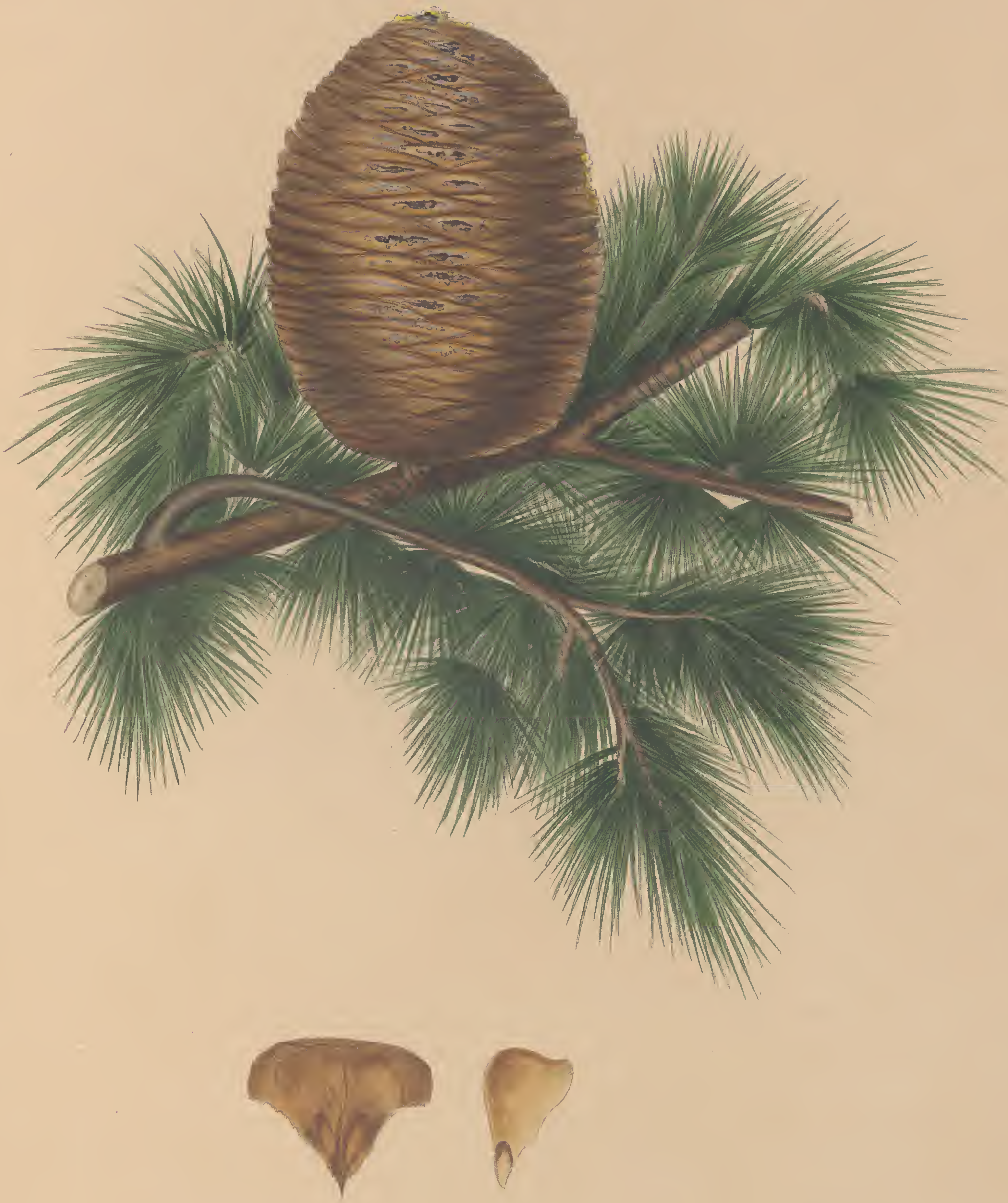

Jas. Black Del.

Jas. Black Fec.

CEDRUS DEODARA. Loudon

Printed from Zinc, by W & A K Johnston, Edinburgh

as to produce any very ſenſible effect. We are told that the foreſts of the Deodar abound in fragrance, but we have not noticed any ſimilar ſtatement regarding the Cedar. If we try to compare the odour of the cut twig and bark, or the bruiſed leaf, by ſimply ſmelling the bruiſed or cut piece, we find very little difference, except that that of the Deodar is the moſt perceptible. But there is another way of teſting this, which gives more decided reſults. If we boil the twig of a conifer for a few minutes in a very ſmall quantity of water, we ſhall find that the water, when cold, has generally a much ſtronger ſmell than the twig had before boiling; but, which is curious, it is not the ſame ſmell. We have no doubt that a chemiſt could diſtil the ſcents of all the conifers, and bottle them up for reference, and that in moſt inſtances the odour of the contents of each phial would announce the ſpecies from which it had been taken. On applying the teſt of boiling to the Cedars, we find that the Deodar produces a ſtrong and pleaſing fragrance, but not ſuch a ſcent as might be expected from a fir; nothing terebinthine or reſinous about it, but a fine nutty fragrance, ſomething (although faintly) like that of oil of almonds. The Cedar of Lebanon gives a fainter trace of the ſame odour, but we have not found it in *Cedrus Atlantica.* We have not obſerved any difference in the odour of the ſeeds, but we can vouch for the young cones of the Deodar and Cedar of Lebanon, both, while in their green ſtate, giving out an exquiſite fragrance; but our knowledge of the odour of the young cones of the *C. Atlantica* is defective.

A difference in the ſmell of the timber is a point which has been much inſiſted on. The wood of the Deodar is ſaid to be "highly perfumed with a moſt grateful aromatic odour, which it never loſes. It has a peculiar odour, ſo that no inſect will touch it."—(Madden.) "The wood is highly reſinous, and gives a delicious perfume to the air."* A writer in the *Gardeners' Chronicle* (25th Feb. 1854) ſays,—"The timber of the Deodar is in one moſt eſſential particular diſtinct from Cedar of Lebanon. The latter is not only ſoft, but very ſlightly ſcented, not much more ſo than moſt kinds of deal; on the other hand, the fragrance of Deodar is ſo powerful, that while the workmen in the meeting-room of the Horticultural Society in Regent Street were planing a large ſlab from India, which had been preſented to the Society, not only was the houſe filled with its ſweet odour, but the ſmell was diſtinctly perceptible in the ſtreet when the door was left open. The ſhavings of it torch and flare with a great flame, but thoſe of the Cedar of Lebanon, whether Engliſh or Syrian, burn with no more fierceneſs than ſhavings of pine wood; in fact, they are as dry to the touch; while, on the contrary, thoſe of the Deodar are remarkably unctuous." It is, however, an error to ſay that the Cedar of Lebanon is not more ſcented than moſt kinds of deal. It depends upon their age, and the amount of reſin with which they are charged. The individual ſpecimens of Deodar timber on which the obſervations were made in Regent Street, muſt merely have been more highly charged with reſin than the ſpecimens which had then been tried of the Cedar of Lebanon. Its preſence in quantity would ſufficiently account for their being harder, more unctuous, burning more brightly, and emitting a ſtronger perfume; as we find to be the caſe, for example, in the Scotch Fir when brought from ſuch a country as Memel or Braemar, where the tree grows ſlowly, and is cloſe-grained; while trees grown in moiſt warm diſtricts in England are comparatively ſoft, with leſs reſin, and conſequently leſs unctuouſneſs, perfume, and inflammability. When the Cedar of Lebanon is of ſufficient age it is as fragrant as the Deodar. Mr Wilſon Saunders tells us that when ſome old Cedar trees were cut down at Putney, ſome years ſince, he got a plank from one of them, which he has uſed in his garden as a board on which to place pots. It has now been there for years, expoſed to the weather, and has been painted; and, notwithſtanding that, it ſtill, whenever the ſun ſhines warmly upon it, ſpreads its powerful and characteriſtic perfume all around.

There is now in the collection of the Royal Horticultural Society at South Kenſington a fine longitudinal ſection, a foot and more in diameter, of a Deodar inarched upon a Cedar of Lebanon, ſent to the Society by Mr Tillery, gardener to his Grace the Duke of Portland, illuſtrative of the timber of both the Deodar and Cedar. In this ſpecimen the growth of both and the junction by the inarching can be perfectly traced, and we have at the one end of the ſlab the wood of the Cedar, and at the other that of the Deodar.

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* Jamieſon, in *Report on Phyſical Aſpect, &c., of the Punjaub*, 5th Oct. 1851.

The Cedar is a little more knotted than the Deodar, and under the microſcope the ſpiral tubes of the latter ſeem a little more open, and more frequent than in the former; but in other reſpects no difference is obſervable. The wood being young, and the ſize not very great, it gives out little ſcent at either end. In burning, however, the Deodar is certainly the moſt inflammable.

Difference in rapidity of growth.

In reſpect of rapidity of growth there is conſiderable difference. *Cedrus Atlantica* is by much the faſteſt, *C. Deodara* the next, and *C. Libani* the ſloweſt.

Difference in ſpecific gravity.

The ſpecific gravity of the Cedar of Lebanon is ſaid to have been determined to be .613. Captain W. Jones of the Bengal Engineers found the ſpecific gravity of the Deodar, on an average of twenty trials, to be .680. But the teſt of ſpecific gravity is one which is liable to be ſo much affected by the age and condition of the tree, its ſtate of dryneſs when weighed, and other particulars, that it is almoſt impoſſible to arrive at a fair compariſon. The ſame ſpecies will give different reſults, according to the climate, ſoil, and moiſture of the place where it grows; and pieces of the ſame tree, cut off at different times in its life, will contradict each other; and when, as in the above inſtance, an average of twenty differing reſults has to be ſtruck, it may reaſonably be diſmiſſed as valueleſs for ſuch a purpoſe as determining the ſpecific identity or difference of two nearly allied trees.

Difference in the durability of the timber.

As to the relative durability of the timber of theſe two Cedars (*C. Atlantica* has ſcarcely entered into this part of the diſpute), much conflicting evidence has been adduced. When we come to ſpeak of the properties of the Deodar, ample evidence will be given of *its* durability. There can be no doubt about *that*. Doubts have, however, been thrown upon the durability of the *Libani*. Loudon declares that it is "by no means durable;" but antient authors are full of alluſions to its ſempiternal endurance; and he, with perfect fairneſs, refers to them, although in oppoſition to the view he has adopted. He attempts to reconcile the diſcrepancy by ſuppoſing, as others have done, that the Antients, in ſpeaking of the Cedar, meant ſomething elſe, as the Juniper, or ſome other tree. This, however, can ſcarcely be accepted as a true interpretation of their meaning, at any rate in many caſes. It may be true in ſome inſtances, and it does not concern us to deny that the knowledge of plants poſſeſſed by the Antients was not ſo perfect as to prevent them at times applying the ſame names to more than one tree, and different, or even the ſame, men applying the ſame name to different trees; but there are paſſages regarding the Cedars which ſcarcely admit of miſapplication. For inſtance, the Pſalmiſt ſays, "The righteous ſhall flouriſh like the Palm tree, he ſhall grow like a Cedar in Lebanon." And the prophet Ezekiel thus deſcribes it: "Behold, the Aſſyrian was a Cedar in Lebanon with fair branches, and with a ſhadowing ſhroud, and of an high ſtature; and his top was among the thick boughs. . . . His boughs were multiplied, and his branches became long. . . . The Fir trees were not like his boughs, and the Cheſtnut trees were not like his branches; nor any tree in the garden of God was like unto him in his beauty." In neither of theſe quotations can there be any queſtion that it was no Juniper, but the Cedar of Lebanon itſelf, which was referred to. If ſo, then the properties, and among them the durability, aſcribed to the ſcriptural Cedar muſt in fairneſs be allowed to be meant to apply to the *Cedrus Libani*. Loudon's own expreſſions on the ſubject are; "The wood called Cedar by the Antients was ſuppoſed to be ſo incorruptible that the expreſſion *dignus cedro* (worthy to be preſerved in Cedar) was applied to anything thought worthy of immortality." "Pliny tells us of a temple of Apollo at Utica (the well-known city of that name in Africa) in which was found Cedar timber that, though nearly 2000 years old, was perfectly ſound." He alſo ſpeaks of a ſtatue of Diana carved in Cedar, which was preſerved in a temple at Saguntum in Spain, and had been brought there from Zante 200 years before the burning of Troy.

We have thus ſufficient evidence, regarding both the Cedar of Lebanon and the Deodar, to ſhew that the wood of each is of great durability. The ſuppoſed ſpecific difference in this reſpect, therefore, diſappears upon examination.

Some ſtreſs has been laid upon a ſuppoſed difference in the ſtrength of the timber, as indicating ſpecific diſtinctneſs. Notwithſtanding that the older authors gave ſtrength as an attribute of the wood of the Cedar

of

Differences in the ſtrength of the timber.

of Lebanon, it is long ſince its timber has been condemned as worthleſs, whilſt, on the other hand, that of the Deodar has been lauded for its ſtrength and value. Probably neither deſerves the full amount of praiſe or diſpraiſe that has been beſtowed upon it: the Cedar is not ſo bad, and the Deodar not ſo good, as has been thought. It is from the Eaſt Indians, and the authors who have taken their information from them, that our belief in the ſtrength of the Deodar has been derived; and it has been acted upon by our countrymen to the extent of importing tons of ſeed, and planting thouſands of acres in this country with the Deodar. It is ſome time ſince its right to ſuch a reputation has been challenged; and although the queſtion is ſtill *ſub judice*, it is probable that if a deciſion were now to be preſſed for, it would not be favourable to the Deodar. Adequate trials of the comparative ſtrength of the timber of the Cedar of Lebanon, the Deodar, and the Atlantic Cedar, have ſtill to be made. We have attempted to do ſo with the ſpecimen of the Deodar inarched on the Cedar of Lebanon, already mentioned as in the collection of the Royal Horticultural Society, and which has certain advantages for the compariſon, both having grown on the ſame root, and of courſe having been ſubjected exactly to the ſame climate, ſoil, and other conditions. A piece of wood, 1 foot in length by 1 inch ſquare, was taken from each end of the ſlab, and each was placed between ſupports 11 inches diſtant, and weights were ſuſpended from the centre, the ſuſpender bearing on the ſpecimens being about a fourth of an inch in breadth. The breakage was as follows:—The Cedar of Lebanon end broke under a weight of 378 lb.; the Deodar under a weight of 448 lb., or about 1-6th more than the Cedar. But the deflection and fracture were even more remarkable. The Cedar ſhewed ſcarcely any deflection at all. When weighted with 224 lb., it deflected 3-16ths of an inch; with 336 lb., it deflected 3-8ths of an inch; and at 378 lb. it broke in two with a ſhort and ſudden fracture, and the deflection already indicated went back. The Deodar, on the other hand, did not begin to deflect until a weight had been put on it which broke the Cedar: at 364 lb. it deflected an inch; at 420 lb. an inch and a half; and at 448 lb. an inch and three-quarters. It then broke in three with a ſudden fracture and loud report, ſhort on the under ſide and half through, ſplit in half from the centre to the one end; the top ſide remained tough, and broke at about two inches from the centre, which remained permanently deflected. The reſult of this experiment exhibits a more marked difference between the two woods than we anticipated, and a very decided ſuperiority in the Deodar. Its actual ſtrength is not particularly great; but it contraſts very favourably with the Cedar, more eſpecially as regards preliminary toughneſs. When it does give way, it has the bad qualities of brittle woods, breaking with a loud report, and throwing pieces of the wood into the air. The Cedar, on the other hand, does not even go through the pretence of not yielding or yielding on conſtraint, but breaks ſhort off like a reed. There is one exception which may be taken to this experiment, however—viz., that the climate or ſoil which would have ſuited the one beſt, was not the moſt ſuitable for the other. We cannot diſpute that it may be ſo; therefore let allowance be made for the objection: *valeat quantum*.

Theſe, we believe, are all the ſpecific differences which have been alleged to exiſt between the three kinds of Cedars, and the above is, we think, a fair eſtimate of their value. The reader, however, may further wiſh to learn the concluſions which have been come to by the moſt eminent authorities, on either ſide, who have expreſſed an opinion on the ſubject. A writer in the *Gardeners' Chronicle* (26th Feb. 1853), who may fairly be aſſumed to be Dr Lindley, or at leaſt to expreſs that botaniſt's views, ſays: "Here, as in ſo many other caſes, the queſtion reſolves itſelf into one of words. It is maintained that theſe trees have deſcended from one common ſtock, in the lapſe of ages, and are, therefore, ſpecifically the ſame. We have nothing to object. The negro and the white, the game-cock and the jungle-fowl, the lap-dog and the bloodhound, the dog himſelf, indeed, and the wolf, have all, in turn, been pronounced by competent authority to be of identical origin; and we are very far from queſtioning the ſoundneſs of ſuch opinions. The ſame kind of reaſoning which juſtifies ſuch concluſions would undoubtedly lead irreſiſtibly to the inference that the Scotch roſe, the dog-roſe, and the Gallic roſe, nay, even the China roſe itſelf, have a common origin: for are they not traceable the one into the other, by inſenſible gradations, and innumerable intermediate forms? But although a wolf may be ſpecifically the ſame as a Malteſe ſpaniel, no one would, we imagine, feel inclined to confound the two, or to conſider them ſtrictly allied, except from a theoretical point of view. Such, we imagine, is the manner in which the Deodar queſtion muſt be practically conſidered. Botaniſts may trace unſuſpected reſemblances; the differences by which the plants are popularly ſeparated may be ſhewn to be trifling and unimportant in the eye of pure ſcience: but the fact remains, that great differences do exiſt; and if they are permanent in a general ſenſe, then the diſtinction of the two is unaffected."

Dr Joſeph Hooker, a more decided advocate of the ſpecific identity of the three ſpecies, but one having had the advantage of writing ſubſequently to the publication of Mr Darwin's theory, and to the diſcuſſions which followed upon it (which was not the caſe with the author of the above quotation), thus ſums up his opinion:—" From what has been ſaid reſpecting each of the three Cedars, it is evident that the diſtinctions between them are ſo trifling, and ſo far within the proved limits of variation of coniferous plants, that it may reaſonably be aſſumed that all originally ſprang from one. . . . Hitherto *C. Atlantica* has been almoſt univerſally conſidered a variety of *Libani*, and *C. Deodara* a diſtinct ſpecies: habit having been relied upon excluſively, and botanical characters neglected; for there is an obvious and marked difference in the latter reſpect between the common ſtates of *Atlantica* and *Libani*, and more between *Atlantica* and *Deodara*. This is perplexing, for *C. Libani* holds an intermediate poſition, both geographically and in character of foliage, between the two that agree in the moſt important characters; and, further, we can account in a great meaſure for the differences of habit by the climate of the three localities: the moſt ſparſe, weeping, long-leaved Cedar is from the moſt humid region, the Himmalayas; whilſt the plant of moſt rigid and otherwiſe oppoſite habit, correſponds with the climate of the country under the influence of the great Sahara deſert. No courſe remains, then, but to regard all as ſpecies, or all as varieties, or the *Deodara* and *Atlantica* as varieties of one ſpecies, and *Libani* as another. The hitherto adopted and only alternative, of regarding *Libani* and *Atlantica* as varieties, and *Deodara* as a ſpecies, muſt be given up. I have dwelt thus at length upon the value of the character ſeparating the three Cedars, becauſe the queſtion, whether theſe are one ſpecies or three, ſtands at the threſhold of all inquiry into the early hiſtory of the plant. My own impreſſion is, that they ſhould be regarded as three well-marked forms, which are uſually very diſtinct, but which often graduate into one another, not as colours do by blending, but as members of a family do, by the preſence in each of ſome characters common to moſt of the others, and which do not interfere with or obliterate all the individual features of the poſſeſſor. Moreover, I regard them as in ſo far permanently diſtinct plants, that though all ſprang from one parent, none of them will ever aſſume all the characters either of that extinct parent, or of the other two forms. There will, in ſhort, be no abſolute reverſion amongſt theſe. Each will yield varieties after its own kind, retaining ſome of the characters of their progenitors, and aſſuming others foreign to them all; and it will depend on their relative ſucceſs in the ſtruggle for life in a wild ſtate, and upon the wants of man in a cultivated one, which of theſe ſhall be preſerved, and for how long." (*Nat. Hiſt. Rev.*, Jan. 1862.)

There is probably little real difference between Dr Lindley's and Dr Hooker's views: they both refer all three varieties or ſpecies to one original parentage. Whether they have advanced ſo far as to believe them independent ſpecies, or have halted half-way at that of permanent varieties, is a mere queſtion of degree, or, as Dr Lindley would put it, a mere diſpute about words. That all three are connected together, and are to be traced to a common anceſtor, no perſon will deny. What that anceſtor may have been, and, if it be one of thoſe now ſurviving, which of them it is, is an intereſting ſubject of ſpeculation. There are no foſſil remains to decide it, but there are ſome geological records which have a bearing upon it.

Dr Hooker, in his examination of the Cedars of Lebanon in their native habitat, found that the Kediſha Valley, to one ſpot at the head of which the Cedars of Lebanon are confined, terminates at an elevation of 6000 feet, in broad, ſhallow, flat-floored baſins; and that the floor of that in which the Cedars grow, is croſſed abruptly and tranſverſely by a confuſed range of antient moraines which have been depoſited by glaciers, which, under very different conditions of climate, muſt once have filled the baſin above them, and communicated with the perpetual ſnow with which the whole ſummit of Lebanon muſt at that time have been deeply covered. The Cedars grow on a portion of the moraine, and nowhere elſe. "The diſcovery of theſe moraines," ſays Dr Hooker, "requires us to extend the influence of the glacial period into a lower weſtern latitude than it has been heretofore proved to have reached. When perpetual ſnows covered the great axis of the Lebanon, and fed glaciers which rolled 4000 feet down its valleys, depoſiting the moraines to which the Cedars in the Kediſha Valley are now confined, the climate of Syria muſt have been many degrees colder than now, the poſition of the Cedars fully 4000 feet lower, and the atmoſphere greatly more humid. Arguing from analogy, it is reaſonable to infer that, at such a time, the Cedars formed as broad a belt on the Lebanon as they now do on the Himmalayas and in Algeria, and were continuous with thoſe of the Taurus; and that theſe alſo deſcended proportionally lower, and ſpread much further to the eaſtward. Again, in the Sikkim and Nepaul Himmalayas, I have found abundant evidence of glaciers having deſcended to fully 4000 feet below their preſent level; and this has been corroborated by numerous obſervers in the weſtern parts of the ſame range: ſo that there, too, the Cedar foreſts may be ſuppoſed to have once deſcended ſeveral thouſand feet, and to have extended weſtwards along the Perſian mountains, till they united with the Taurus foreſts. It is more difficult, at firſt ſight, to connect the Algerian with the Aſiatic foreſts; but here the recent diſcoveries of extenſive modern changes in the form and extent of the Mediterranean baſin, come in aid. It is not now doubted that the remains of the African hippopotamus and rhinoceros in Sicily prove a former continental extenſion from the Tunis coaſt to that iſland; and the ſoundings between Cape Bon and Sicily appear to corroborate this view. It would be folly to aſſume it as certain, that the extenſion of theſe moſt recent diſcoveries will clear up the early hiſtory of the diffuſion of the Cedars, but it is conceivable; and if proved, it is reaſonable to ſuppoſe that their ſubſequent ſegregation in the areas they now inhabit was effected by the warmth of the period which ſucceeded the glacial epoch. During ſuch a warm period, the vegetation of the low levels would be driven to ſeek colder localities, and to migrate both northward and up the mountains, where it has left traces in the grove on Lebanon, and in a few arctic plants which I obtained on the very iſolated ſummit of that mountain. Laſtly, it is an eſtabliſhed fact, that all plants of wide diffuſion vary much, and that the extreme forms occur towards the limits of the area they occupy; whence, in the caſe of the Cedars, what may once have been three prevalent varieties in different parts of a continuous foreſt, became, by iſolation and extinction of intermediate forms in intermediate localities, three permanently diſtinct races or ſubſpecies, which we now recogniſe as Lebanon, Algerian, and Deodar Cedars." (*Nat. Hiſt. Rev.*, Jan. 1862.)

The Cedars being of a more alpine or temperate character than that of the climate of the latitudes in which they are now found, and confined to the mountains, their original type muſt probably have been in exiſtence before the intruſion of the cold of the glacial epoch into ſouthern regions, and have been puſhed by it as far ſouth as the Himmalayas on the one hand, and the Atlas on the other. No doubt it is poſſible that it may have come into exiſtence at that time; but it is wholly inconſiſtent with any data which we poſſeſs, that it ſhould have come into exiſtence ſubſequent to it. The moſt ſouthern limit in which any of the Cedars have been found, is about lat. 30° N. on the weſtern borders of Kumaoon, about half-way acroſs the chord or baſe of the Indian continent. It may perhaps be fair to aſſume, therefore, that this is the ground on which the original ſpecies ſtood, before the retirement of the glacial cold, and that the ſpecies now found there—viz., the Deodar—is more likely to have preſerved the features of the original parent than the Cedar of Lebanon or the Atlantic Cedar, which could only have taken their place on Lebanon or Mount Atlas (both 4° more to the north than the moſt ſoutherly limit of the Deodar) at a more recent date, when the gradual retirement of the glacial cold northwards left the mountains free from ice for them to occupy.* It is

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* Of courſe, it may be argued that it is poſſible that the Deodar has ſubſequently ſpread to the ſouth. This is leſs likely than that, being a temperate tree, it ſhould ſpread to the north; and is inconſiſtent with what we learn from Major Madden, that its moſt ſoutherly occurrence in India is in Kumaoon, where it is only found around temples, where it has been introduced, and has not ſpread. A very little farther to the north it is found occupying detached poſitions; and it is only when we get farther to the north-weſt that we find it in foreſts, extending over the whole mountains of Affghaniſtan.

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is true that the moſt northerly limit of the Deodar is almoſt as far north as the moſt ſoutherly limit of the other two; but that has leſs bearing on the point. It is the moſt ſouthern limit of all which we have to ſtart from. It ſhould follow that the other Cedars are ſpecies or varieties derived from the Deodar, and neither of them the parent form. It matters little whether we call them ſpecies or varieties. For ourſelves, ſeeing how cloſe other different ſpecies of Conifers which are acknowledged to be diſtinct come to each other, we accept them, for *practical* purpoſes, as diſtinct ſpecies. *Philoſophically* viewed, we regard the Cedar of Lebanon and the Atlantic Cedar as varieties of the Deodar, on their way to become ſpecies, but which have as yet only reached different ſtages on the road.

*Geographical Diſtribution.*—Fourteen hundred miles to the eaſt of Lebanon and Taurus the Deodar firſt appears, as fourteen hundred miles to the weſt of it the *Cedrus Atlantica* does on the other ſide. It firſt appears in Affghaniſtan, where it outnumbers every other Pine, and extends thence continuouſly eaſtward along the Himmalayan range, at elevations of between 1200 and 4000 feet, almoſt to the confines of Nepaul. The moſt weſterly and moſt northerly limit are the ſame, viz., the weſt of Affghaniſtan, about 34° north latitude and 68° eaſt longitude. It thence extends eaſtwards and ſouthwards, along the Himmalayan ridge, both the main ridge and its ſubſidiary branches, until it reaches Nepaul, not extending farther eaſt than from 83° to 85° eaſt longitude. How far it reaches to the north in its eaſtern range is not known, but it is thought that it does not extend beyond the northern ſlope of the Himmalayas. As it advances ſouthwards it becomes leſs continuous and leſs widely ſpread: confined to the head of this valley or that glen, perhaps not to be found in the next, but reappearing again in another farther on. For inſtance, it is not to be found in the glen of the Kaleegunga (leading to Kedarnath), although it is found, on the one hand, in the valley up to Gungotree, and, on the other, in the valleys near the ſources of the Dhoulee and Viſhnoo Gunga rivers; a circumſtance no doubt uninfluenced by anything relating to the valleys, but depending on the upper connexions of the ranges which ſeparate them. The habitat of the Deodar may be ſaid to ceaſe here; for, as ſuggeſted by Major Madden, although it is found in many ſpots in the eaſt of Kumaoon, and alſo in the weſt of Nepaul, the fineſt trees are all in the neighbourhood of temples, and have no doubt been introduced (the tree being thought ſacred), juſt as in Great Britain the largeſt yews are thoſe by the churches.* From theſe temple-trees other trees have been diſtributed; but their ſize and diſtribution ſufficiently atteſt the ſource from which they have been drawn. It is ſaid to be found on the ſnowy ridges in Central Nepaul; but this requires confirmation. They are to be ſeen in greateſt perfection near the ſnowy range and lofty mountains of the interior of the Himmalayas, where for half the year it is enveloped in ſnow. Thoſe who wiſh a more detailed note of the various localities in the above diſtrict where it has been obſerved, will find full information on the ſubject in Major Madden's paper above cited.

*Hiſtory.*—Perhaps the Deodar is the earlieſt tree of which mention is made in profane hiſtory. It is ſpoken of in the antient hymns of the Hindoos under the name of Devadaru (derived from *deva*, a deity, and *daru*, timber). The exact application of this term has formed the ſubject of much learned and antiquarian diſquiſition, many trees competing for the divine cognomen; but it ſeems to be admitted, by general conſent of thoſe who are qualified to give an opinion on the ſubject, that the Devadaru of the Shaſtras is the Himmalayan Devadaru. If Himmalayan, there is not much choice: there are only three Himmalayan trees which have any pretenſions to the attributes aſcribed to the Devadaru: it muſt be either the *Pinus longifolia*, a Cypreſs, or the Deodar. This may be matter of intereſt to antiquarians, but its intereſt to naturaliſts is very ſmall, therefore we ſhall not inflict upon our readers even a reſumé of the arguments which have been adduced on either ſide of this foggy dreamland queſtion. It will not diminiſh the ſtature of the Deodar one inch although it ſhould be proved not to be the true Devadaru; nor ſhould we nowadays truſt an iota more to its virtues, though all the qualities aſcribed to it by the antient hymniſts were authoritatively ſettled to belong to the Deodar, and to the Deodar alone. Nevertheleſs, we ſhall probably be right if we accept the generally received opinion, that the Devadara and the Deodar are one and the ſame thing. Another antient notice of the tree is that of Avicenna, who, 800 years ago (*vide* Royle's *Hindoo Medicine*), mentioned it under the name of Duidar, as an Indian pine, yielding a kind of turpentine.

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* "The pilgrim to Budureenath and Kedarnath may occaſionally be met carrying a young Cedar, as the moſt acceptable gift to the ſhrine, next to the Company's rupee, which is everywhere the moſt ſacred and all-ſufficient."—*Madden, loc. cit.*

The firſt modern knowledge which Europeans had of it was through the Hon. W. Leſlie Melville, who, in 1831, brought ſeeds of it to this country. Theſe he ſupplied to the Horticultural Society's Gardens at Chiſwick; to Lord Grenville, at Dropmore; to Mr Lambert; and to his own relative, Lord Leven and Melville of Melville, in Fifeſhire. In a letter written in 1841, he records the date: he ſays,—"Mr Paxton, in his liſt, I believe, antedates the introduction of this tree; at leaſt it was in April 1831 that I landed with my ſeeds, and if any older plant can be ſhewn, I have no claim to it." Mr Froſt tells us that he was aſſured by his predeceſſor, the then gardener at Dropmore, that one or more of the trees in the Dropmore grounds were planted in 1829; but we imagine that this muſt be a miſtake, and we have no doubt that it is to Mr Leſlie Melville that the introduction of the Deodar is really due. Thriving trees, the oldeſt in Britain, remain at moſt of the above places, as well as in their neighbourhood, raiſed from ſome of the ſeeds beſtowed by thoſe who had received them; as, for inſtance, in the manſe garden at Monzie, near Melville; at Bury Hill, from ſeeds ſent to Mr Barclay by Mr Lambert, &c. Dr Watſon (brother of Mr Sheriff Watſon, of Aberdeen) came home with Mr Leſlie, who gave him ſome of the ſeed. Theſe were grown at Liberton; and the only one which ſurvived is now in our nurſery at Bangholm, a mutilated ſpecimen, it having been injured in the tranſplantation. The next *envoi* of ſeeds was in 1832, when ſome were ſent from India by the late Lord William Bentinck: theſe were ſown at Welbeck, but only ſeven vegetated.

The valuable qualities which the tree was reputed to poſſeſs, combined with its beauty, which was patent to all eyes and could not be diſputed, immediately rendered this tree a univerſal favourite. Its renown ſpread, and ten years later (1841) the Right Hon. T. F. Kennedy, who was then at the head of the Board of Woods and Foreſts, dreading an inſufficient ſupply of Oak in future years for the purpoſes of the Navy, and believing (what every one ſaid) that the Deodar was as hardy, ſtrong, and durable as the Oak, with the advantage of growing much more rapidly, took counſel with the Earl of Auckland, then Governor, and the Court of Directors of the Eaſt India Company; and they came to the concluſion that it was an object of national importance to ſecure the introduction and growth of this tree in large quantities throughout Britain. To this end, Mr Kennedy, on his part, obtained from the Directors very large quantities of ſeeds (the rapid tranſit of the overland mail ſecuring their arrival in good condition), the rearing of which was intruſted to four of the principal nurſerymen in Britain—viz., Meſſrs Glendinning of Chiſwick, Skirving of Liverpool, Waterer of Knaphill, and ourſelves. Seeds were alſo ſown in the Royal Foreſts, more eſpecially in the New Foreſt, and an immenſe number of young plants were raiſed. Some of theſe were killed by the froſt, but a large quantity ſtill remain, which have been planted out and are doing well. A much more extended introduction, however, was contemplated than even the Royal Foreſts could afford room for. The Eaſt India Board ſent large quantities from their Botanic Garden at Saharumpore (near the foot of the Himmalayas), which they ſupplied gratuitouſly to every one who would pay the coſt of carriage. And not only this, but they took a liberal ſtep, which did more to ſecure its wide-ſpread introduction than any excluſively governmental effort could have done: they imported large quantities, which they diſtributed gratuitouſly to the principal nurſerymen in England, leaving them to make their profit from them, and ſo to ſpread them abroad in the ordinary way of trade. The reſult has been that thouſands of young plants are now flouriſhing in all directions throughout Britain; and thus one of the nobleſt of purpoſes, that of permanently increaſing the wealth and beauty of one's country, has been rapidly accompliſhed. Dr Lindley thus celebrates the important fact at the time: "It is no longer as a ſolitary ſpecimen to be viewed in ſome rare collection, that the Cedar of the Himmalayas has reached our ſhores; but thouſands and thouſands are in the poſſeſſion of many of the great landed proprietors of Great Britain, and more are daily pouring in. Even in the north of Ireland it is ſpringing up like the Larch in open ſeed-beds; and we ſhall ſoon ſee this noble timber tree quoted in the nurſerymen's liſts at the price of the worthleſs though magnificent Cedar of Lebanon" (*Gard. Chron.*, 1841).

The prophecy thus made came true enough;* but the inference contained in the laſt lines, that the Deodar is ſo much a nobler and more valuable tree than the Cedar, has not been wholly borne out. For ſome years the ſaith in the ſuperior properties of the Deodar continued unchallenged; but about 1853 or 1854 a whiſper began to ſpread abroad that perhaps we had been too haſty in taking ſor granted the accounts of its excellences; that it would be a ſad miſtake if we ſhould neglect the growth of the Oak for it in the Royal Foreſts, and it ſhould afterwards turn out not to anſwer—a miſtake which might be diſcovered not by us, but by our deſcendants, when the Oak foreſts had diſappeared, and been replaced by Deodars. We do not know who firſt ſounded the note of alarm. Mr Strickland of Hildenley is one of the firſt whom we find gently ſuggeſting, in the periodicals of the day, the poſſibility of the tree being leſs ſuitable than was thought; but the importance of the queſtion was inſtinctively recogniſed, and thoſe who believed in its ſuperiority, and had recommended its cultivation, preſſed forward to vindicate their opinion. Numerous papers from various pens appeared in the horticultural periodicals of the day, in which the queſtion was ably diſcuſſed; and a Report was made to the Commiſſioners of Woods and Foreſts by Dr Royle, who was a zealous advocate for the Deodar, and appears to have ſtrongly recommended its being planted on a large ſcale by the Commiſſioners. In that Report (publiſhed in 1853) he accumulated all the evidence of its value which could be obtained from books or men familiar with the tree in its native country. He cauſed the large planks already mentioned to be ſent to this country, and exhibited them at a meeting of the Horticultural Society, and afterwards got Mr Wilſon Saunders and other members of Lloyd's to examine them, and obtained a favourable report from them. Their examination, however, appears to have been confined to ocular inſpection, without any comparative trials of ſtrength. "*It appeared*, they ſaid, to be ſuperior to common Larch." The maſſive dimenſions of theſe planks ſeemed to have impoſed on every one, taking their ſenſe captive. "No one converſant with ſuch ſubjects could look at the huge ſpecimen without recogniſing in it a deſcription of timber ranking among the higheſt of its claſs" (*Gard. Chron.*, 25th Feb. 1854). They ſhewed ſuch a goodly outſide, that no further examination or teſt ſeems to have been thought neceſſary, at leaſt none is recorded; and if any had been made, it is not likely that it would have been paſſed in ſilence, eſpecially as we have now ſtrong reaſons for thinking that, if it had been made, it muſt have ſhaken the faith of the experimenter, and modified the aſſured tone of his opinion. Moſt of this evidence will be found recapitulated in our remarks on the properties and uſes of the tree. It ſeemed to convince the public at the time; at leaſt, the diſcuſſion ended, leaving the believers in the virtues of the Deodar apparently maſters of the field. Notwithſtanding this, the doubts caſt upon it were not wholly eradicated; a feeling of diſtruſt ſurvived, and botaniſts and the public, although their mouths were ſhut by the caſes quoted and arguments uſed, reſerved their judgment. Data for determining the point were wanting. The timber might be all that could be wiſhed in its native country, and yet the change to this climate might have a deteriorating effect upon it, which might render trees grown here not fitted for our purpoſes. American trees ſeldom acquire in this country the excellence they poſſeſs in their native land. We poſſeſs neither the heat in ſummer neceſſary to ripen the wood, nor the cold in winter to give it ſufficient repoſe. Nay, more; analogy was drawn from the Cedar of Lebanon, which is ſaid to be of great excellence on the Syrian mountains, while it is periſhable and valueleſs with us. The Scotch Pine and the Pinaſter are nearly related, but the one is much more valuable than the other. Even in the native country of the Deodar it might only be the timber of very old trees, or of trees grown under peculiar conditions of ſoil or climate, which poſſeſſed the valuable properties aſcribed to it. And yet, again, it might be that the properties for which it is ſo much valued in its native habitat, might not be exactly thoſe which are wanted for our ſervice
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* Loudon, in his *Arboretum* (1838), quotes the plants as being ſold at two guineas. In 1854 they could be had at ſixpence a-piece.

in this country. It will preſently be ſeen that theſe miſgivings were not without foundation. Although further corroborative experiments are ſtill needed to put the matter beyond diſpute, there appears little reaſon to doubt, that although the Deodar muſt always rank high for many excellent qualities, eſpecially for beauty, durability, and general uſefulneſs, and much before the Cedar in regard to ſtrength, it cannot be reckoned a firſt-claſs timber.

*Properties and Uſes.*—Of all the properties aſcribed to this tree, there is none which is better authenticated than the durability of its timber. Kyaniſed by the hand of nature, it defies wind and weather, reſiſting the ſoaking rains of the Himmalaya Mountains for ages. Rot under any aſpect is unknown to it. It would be tedious to accumulate evidence of the fact that, throughout all the diſtricts where it grows, it is largely employed in the conſtruction of houſes, temples, and bridges; and very generally their buildings are conſtructed on a plan which, although moſt trying to timber, is well calculated to ſhew how capable the Deodar is of bearing all the viciſſitudes of a moſt variable climate. It is uſed not only as timber is commonly uſed, under cover, but for verandahs and roofs, as well as for the external framework of houſes. This framework is firſt made, and then the interſtices between the timbers are filled up either with hewn or unhewn ſtones, ſo that the wood is expoſed as much as the ſtone, as well to the influence of wet as to cold and drought. Moorcroft mentions that, in his time, a building erected by the Emperor Akbar was taken down, and its timber, which was that of the Deodar, was found to be ſo little impaired as to be fit to be employed in a houſe built by Rajah Shah. Its age, it was calculated, could not be leſs than 225 years. In a building, which had a dome of excellent brick-and-mortar work, in which was buried the mother of a ſovereign who began to reign in 1417, and died in 1473, pieces of Deodar were let into the walls, and their ends or ſides were left on the ſame plane with the brickwork. This wood, although ſo much expoſed to the influence of the weather, was neither crumbly nor worm-eaten, but was jagged, from the ſofter part of the annular rings having been often waſhed by the rain. (*Moorcroft's Journal*, quoted in Lambert's *Genus Pinus*.)

In the walls of old temples, now levelled nearly to their foundations, the timbers of the Deodar are to be ſeen, the ſurface bleached and ragged, but the body of the wood undecayed, and emitting its characteriſtic odour as freſh as ever. In Caſhmere, the very tall pillars which ſupport the roof of the Jumna Muſjid or Great Moſque, built by Aurungzebe in the days of our later Henrys, are formed of Deodar trees denuded of their bark. They exhibit not a crack or veſtige of decay, either from expoſure, rot, or inſects, and ſtill ſmell like pencil wood.

Major Madden writes, "In the walls of temples in Kunawar, beams were pointed out to me ſhewing no ſigns of decay, except being a little charred and blackened on the ſurface by the action of the ſun and weather; and theſe temples were ſaid to have been built from 600 to 800 years ago. This is probably an exaggeration; but Captain P. Gerard lived in a houſe, aſcertained to be 200 years old, at Summerkot, between Rooroo and Bampore, the property of the Biſſehur Rajah, in which the timber was as found as the day it was cut. It is in great requeſt for the walls and roofs of temples and houſes, and for granaries, cheſts, and other purpoſes, where the ravages of inſects, &c., are apprehended."

The bridges in the countries of the Deodar are wooden ſtructures, formed of Deodar timbers overlapping each other until they meet in the centre; the other ends being ſteadied by being ſunk into the banks and kept down by great weights. In Caſhmere the Deodar is alſo employed for making the piers on which the arches of the bridges ſtand, as well as for building houſes and moſques. Pieces of its timber from the Tem-al-Kudal bridge (over the Jhelum) were found little decayed, although they had been expoſed to the action of water for 400 years.—(*Moorcroft's Travels.*) Dr Royle quotes a letter from Colonel Tait, C.B., in which he ſays, "When in Caſhmere, I found the bridges over the river Jhelum, at the town of Terrie Nuggur (the old capital) built entirely of Deodar. Even the piers on which the arches reſt are compoſed of large blocks of this wood; and from the conſtant riſing and falling of the river, they muſt be expoſed alternately to the action of water and to the burning heat of the ſun, as well as to intenſe cold in winter; and theſe bridges are known to have exiſted for an immenſe number of years, and may have been built centuries ago. They appear never to have had any aid from painting. In all the old temples in Caſhmere, where wood is employed, the Deodar alone is uſed, and the antiquity of ſome of the temples is very great indeed. When my regiment was ordered to be cantoned at Jhelum, in the Punjaub, after the laſt campaign, we had to build houſes for ourſelves, and lines for our men to live in. I procured the Deodar timber from the hills bordering on Caſhmere, as being conſidered the kind of wood beſt adapted for building purpoſes, both on account of its durability, and as being leſs likely to ſuffer from white ants." Almoſt all the boats in the valley of Caſhmere are built of Deodar; and when they get crazy at the joinings by age, the old planks have their weathered ſurface planed off by the adze, and are then undiſtinguiſhable from the new wood with which they are repaired. Dr Jameſon, in the Report above referred to, tells us that, "on the banks of the Jhelum, Chenab, and Ravee rivers, extenſive boat manufactories exiſt. The beſt and moſt expenſive are built entirely of Deodar. An inferior kind is made with the outſide of Deodar, and the inſide of Cheer (the wood of *Pinus longifolia*). Theſe boats will laſt from 20 to 30 years. Dr Jameſon adds that the only tree in the Britiſh Himmalayas which produces timber fitted for ſpars of ſhips is the Deodar, all others being too ſoft, or too eaſily acted upon by the weather. A requiſition for ſpars of the Deodar 80 to 90 feet long, made by the Superintendent of Marine at Bombay, could not be ſupplied, ſolely on account of the difficulty of tranſportation, owing to the falls on the Sutlej, and the rugged and inacceſſible nature of the country." It is ſaid alſo to have little tendency to warp, a quality eſpecially valuable for boats, and probably due to the ſtraightneſs of the grain of the timber. On ſome other points, where one would think there ought to be no uncertainty, we have ſomewhat contradictory reports. One writer ſays, "The wood is ſo ſtraight and equal in the grain, that it gives planks 3 feet broad, ſimply by the action of the wedge. Timber-ſaws are unknown in the Himmalayas." While, on the other hand, Major Madden writes, "It takes the ſaw kindly, but will not ſplit into planks." Again, he ſays, "It has the advantage of requiring little or no ſeaſoning;" but, at the ſame time, he quotes an opinion from Mr Mines to the effect that, "if cut young, it will ſoon decay when in contact with much damp." Dr Royle dwells on the fine grain of the wood, ſo cloſe that the annular rings can ſcarcely be counted, while other writers ſpeak of the openneſs of the grain.

Out of all this, one thing ſeems clear beyond diſpute, and that is, that the timber of the full-grown Deodar in its native country is extremely durable. That its ſtrength is conſiderable ſeems proved. People would not make bridges, temples, houſes, and boats of a wood that was deficient in ſtrength. Still, it may be only relatively ſtrong. It may be the beſt of the Himmalayan woods; but there is nothing to hinder bad being the beſt. The next ſtrongeſt ſeems to be the *Pinus longifolia* (or Cheer), and this is known to be a ſoft and inferior wood. A trial of the two, made by Major Abbot, ſhewed their relative ſtrength to be in the ratio of .593 (for *Pinus longifolia*) to .760 (for the Deodar). We ſtill want further experiments to teſt the actual comparative ſtrength of the Deodar itſelf, eſpecially of that grown in this country. It is not eaſy to get a good large piece of wood to experiment upon. A large piece, which was being ſent to the Great Exhibition in 1851, unfortunately fell into the river Hoogly as it was being hoiſted into the ſhip with other timbers. None was ſent to the Exhibition of 1862. The experiments which have been made, however, tend to ſhew that, although by no means a firſt-claſs wood, the Deodar is not greatly behind the Britiſh Larch in ſtrength. Dr Royle records the following reſults of experiments by Captain Jones, although he can ſcarcely have been aware of their bearing, for had he been ſo, he muſt have ſeen that they were fatal to the claims of the Deodar to be a firſt-claſs timber. He tells us that Captain W. Jones, of the Bengal Engineers, found, by repeated experiment, that pieces of ſeaſoned Deodar timber, of good ſtraight-grained wood, 4 feet in length and 2 inches in breadth, broke with weights of 1588 lb., 1636 lb., and 1540 lb.; while pieces of 8 feet long, 2½ and 3 inches thick, broke, the croſs-grained with 1092 lb., the fine-grained at 1188 lb. and 1700 lb.; but that knotty pieces broke at 750 lb. and 964 lb.; while ſpecimens of the ſame length and thickneſs, but which had been cut only one month, broke at 829, 908, 964, 1028, and 1116

1116 lb., the two latter from the heart of the tree, the others from the outſide of the tree. Now, we know the breaking weight of a piece of Britiſh Oak of the ſame ſize is between 5000 lb. and 6000 lb., ſhewing that it is at leaſt five times ſtronger than the Deodar. But as Mr Wilſon Saunders put the caſe, in the opinion on the appearance of the Deodar, which he is reported to have given above, woods for ſhipping purpoſes may be divided into hard woods, ſoft woods, and intermediate woods. He inſtanced the Larch as an intermediate wood, and thought that the Deodar might rank higher than the Larch. But Mr Saunders has ſubſequently aſcertained that in this he was in error, the relative breaking weight of the Britiſh Larch to that of the Deodar being as 168 lb. to 154 lb.; and we have reaſon to know that he has conſiderably modified the favourable opinion which he then expreſſed of the Deodar as a wood fitted for naval purpoſes.

In a recent article in the *Gardeners' Chronicle* (Jan. 1864), Mr Saunders details the reſults of experiments ſince made by him, from which the poſition of the Deodar, as regards reſiſtance of breakage, will be ſeen. He took lengths of each of the woods enumerated in the following table, carefully ſquared to $1\frac{1}{4}$ inch, and ſubmitted them to the preſſure of weights pendent from the centre, the lengths being ſupported between ſtandards exactly ſix feet apart. The weight at which each broke, and the amount of deflexion from the horizontal line at the time of breaking, are given in the following table:—

| | lb. | Deflexion in inches. | |
|---|---|---|---|
| "Douglas Fir, | 280 | 4. | fracture, rough and long. |
| Pitch Pine, | 280 | 4. | ,, ſhort and even. |
| Canada Spruce, | 196 | 4.7 | ,, ſhort and rough. |
| Red Pine, | 168 | 6. | ,, rough. |
| Britiſh Larch, | 168 | 5.2 | ,, ſhort and even. |
| Deodar from Himmalayas, | 154 | 3.8 | ,, ſhort." |

The ſpecimens experimented on were carefully ſelected from the beſt deſcription of wood, and free from all defects. The deflexion is in inches and tenths of an inch. Each wood had two trials, and the figures give a mean reſult. He found that not only is the Deodar ſomewhat weaker than the Britiſh Larch, and of courſe ſtill weaker than the Hackmatac or American Larch, but it is alſo more deficient in tenacity. With him, as in our experiment, the Deodar, when it broke, did not give way ſlowly, toughly, and almoſt imperceptibly, but ſnapped ſhort and brittle, ſending its fragments leaping into the air. We imagine, therefore, that it muſt now be admitted, that however valuable the Deodar may be as a lovely addition to our hardy evergreens, and a uſeful ſecond-claſs wood, we muſt diſmiſs all expectations of its ever being a ſuitable ſubſtitute for the Oak, or of its being of much value for naval purpoſes.

There are other purpoſes, however, for which we ſhould think its qualities peculiarly adapt it. For many of the purpoſes for which the Larch is uſed, it may be found even better adapted than it. With nearly the ſame degree of ſtrength, it has much more durability, and therefore it ſeems peculiarly ſuited for palings, ſleepers for railways, roofing for houſes, &c.; in fact, every purpoſe where durability under expoſure is more wanted than great ſtrength. It will alſo be found, in ſheltered ſituations, in ſome reſpects well fitted for a nurſe. The Scotch Pine is ſo heavy and compact in its foliage that it keeps off light from the deciduous trees which grow among it, and offers great obſtruction to the free circulation of air, doing about as much harm in this way as it effects good by giving ſhelter from heavy gales. Its poles, too, are ſo bad, that they muſt always bear a low price in the timber market, being fit for little except for pit props, for which the thinnings are chiefly uſeful. Larch, which is a far better nurſe, becauſe its light airy foliage and pyramidal form offer no hindrance to the action of light and the free circulation of air, and whoſe poles uſually fetch a good price, has the fault of being deſtitute of leaves in the early ſpring, and is, moreover, ſubject to the myſterious and incurable "rot." On the other hand, the Deodar combines the graceful form of the Larch with the evergreen character of the Scotch Pine. The chief objections to it as a nurſe are its comparatively ſlow growth and its inability to bear wind. It has not half the rapid growth of the Larch in its young ſtate, and not even nearly that of Auſtriaca and Laricio. But its incapacity to ſtand wind is a ſtill more ſerious objection to uſing it as a nurſe. The wind cauſes it to laſh off its buds, and ends by killing it. It will therefore neither do for a nurſe nor anything elſe in very expoſed ſituations. It will ſtand long tracts of heavy rain, or of ſnow and cold, for to all theſe it is accuſtomed in its native country; but to violent and long-continued winds it is not: the deep, almoſt ſtifling, ſheltered valleys and ravines in which it is found are very different from the bare ſweep of a Scottiſh hill-ſide or Yorkſhire muir. If protected from wind, there is nothing in the climate of this country to diſqualify it for the duties of a nurſe. The Himmalayan climate is very variable from March to June, and very fine and dry from the middle of June to the middle of September. The winter is very cold, and the mountains are for a conſiderable time covered with ſnow, ſo that, as regards temperature, there is as much variety there as in our own climate.

*Culture.*—As may be inferred from what has juſt been ſaid regarding the climate and phyſical conditions of its native habitat, the Deodar generally thrives well in this country. It is certainly not ſo hardy or ſo well adapted to our climate as the Scotch Pine or Norway Spruce; but notwithſtanding this, it thrives too well to deter any one from planting it for fear of loſs. The winter of 1860-61 was the moſt ſevere that has happened ſince its introduction. It was a winter ſuch as had ſcarcely any parallel for ſeverity in the memory of man, and unleſs ſome general change of climate ſhould take place, it may be looked upon as exceedingly improbable that any cold of greater intenſity ſhould again viſit us. The effect of that winter upon the Deodar may therefore be taken as a ſafe guide in judging of its ſuitableneſs for our climate; what that effect was we are, as already mentioned, enabled, through the kindneſs of Mr Palmer, to ſtate with accuracy.

Mr Palmer's record of obſervations ſhews that the Deodar is by no means ſo hardy a tree as the Larch, and alſo that it is the leaſt hardy of any of the Cedars. There is no inſtance of any of the Larches reported to him having been injured by the cold in 1860; while out of Deodars growing at 211 places in Great Britain and Ireland, plants were killed at 55, and were uninjured only at 80, having been more or leſs injured at the remaining 107, a percentage of frailty much greater than we ſhould have anticipated. The Cedar of Lebanon and the *Cedrus Atlantica* proved more hardy, and about equal between themſelves. The following ſummary will ſhew the actual reſults of Mr Palmer's report on all three:—

| | Total places reported on. | Not injured. | Injured. | Much injured. | Killed. | Proportion of killed and much injured. |
|---|---|---|---|---|---|---|
| Cedrus Deodara, . . . | 211 | 80 | 50 | 26 | 55 | 1 in 2½ |
| „ Libani, . . | 81 | 51 | 19 | 6 | 5 | 1 in 7 |
| „ Atlantica, . . | 74 | 48 | 19 | 2 | 5 | 1 in 10½ |

It may be intereſting to notice in what proportions the three different parts of the kingdom suffered. It was as follows:—

| | Total places reported on. | Not injured. | Injured. | Much injured. | Killed. | Proportion of killed and much injured. |
|---|---|---|---|---|---|---|
| Scotland, . . . | 64 | 19 | 26 | 14 | 5 | 1 in 3½ |
| England, . . . | 142 | 61 | 24 | 13 | 50 | 1 in 2½ |
| Ireland, . . . | 4 | 3 | 1 | | | |

In Scotland, then, about one-third of the plants reported on eſcaped without injury, and about one-thirteenth were killed. In England, nearly a half eſcaped uninjured, while about one-third were killed; but the proportion of injured plants was twice as great in Scotland as in England. In Ireland the number of plants reported on is too few for generaliſation. The average of cold alſo in Scotland was conſiderably greater. Why in Scotland, where the cold was greater, and the climate leſs genial, it ſhould happen that a much ſmaller proportion (not a fourth of the number) of plants were killed, while more were injured and fewer entirely eſcaped, is a queſtion which probably may in a great meaſure depend on the age and individual circumſtances in which each plant was growing. *Ceteris paribus*, it appears that the younger the plant, the worſe it has fared. In 1860, the fine avenues in front of Chatsworth were killed, and almoſt, if not all, the Deodars in the park there; alſo the fineſt ſpecimens at Cloaton; and at Ravenſwood, near Melroſe, ſeveral fine plants about 20 feet in height were killed.

There are at leaſt five varieties of the Deodar, ſome of a more robuſt habit, ſome more pendent, ſome more erect or more tabulated than others; while the depth of colour alſo varies conſiderably, ſome being brighter green, and ſome more glaucous than others. Theſe, as already mentioned, have received nurſerymen's names, as *Deodara robuſta*, *D. viridis*, *D. nivea*, *D. craſſifolia*, &c. Mr Palmer found some difference in the hardineſs of theſe, *robuſta* having proved the hardieſt, and *viridis* the moſt tender, in the proportion of more than two to one: out of 24 of each of theſe two, he found that 13 plants of *robuſta* eſcaped uninjured, while 4 were killed; and of *viridis*, only 6 eſcaped uninjured, while 11 were killed.

The Deodar ſeems very indifferent to ſite, ſoil, and ſubſtratum, flouriſhing in its native mountains equally amongſt the clefts of the moſt ſcarped rocks, gneiſs, quartz, limeſtone, granite, clay, and mica ſlate, as in the black vegetable mould of the glen or ravine. It is the ſame in this country. No ſoil ſeems unſuited for it except ſand; indeed, few Conifers thrive in ſand. For example, in Berkſhire, where the ſoil is ſandy loam without lime, it makes ſlow progreſs; while in Glouceſterſhire it grows rapidly on a lime and clay ſoil without ſand. It thrives well on the oolite. Even in undrained wet clay it thrives. It cannot, however, ſtand the ſea breeze. Wherever it is expoſed to its ſaline influence it dies; but when protected from it, though only a very little inland, it does well.

Its growth is rapid. On an examination of the Indian ſlab already mentioned, it was found that, notwithſtanding it was 4 feet 6 inches in diameter, it was not more than 190 years old. The rate of growth had varied between 6½ and 3½ inches of increaſe for every ten years, the larger increaſe taking place chiefly in its older ſtage. According to this datum, and ſuppoſing the trees to grow as faſt in England as in their native country, in the ſpace of thirty years they ſhould be 26 inches in diameter, or about three times as thick as Larch of the ſame age. Mr Brown, in his tables, gives 9½ inches as the average diameter of Larch in Scotland of that age. It is rather ſurpriſing that the fact of ſuch a rapid increaſe of growth in their native country ſhould not have ſuggeſted doubts of the ſtrength of the timber: ſoftneſs and rapidity of growth being almoſt ſynonymous terms. "A ſlow ſupply of nutriment is neceſſary to prevent the tree growing too rapidly," ſays Dr Lindley; and Dr Royle, in his Report already quoted from, ſeems to have contemplated the neceſſity of checking its too rapid growth. He ſays, "The great precaution required in planting this, as in other timber trees, is to avoid planting it in too moiſt or too rich a ſoil, when it is required for timber. It would be proper, indeed, to ſelect well-drained ſites on the ſteep and barren acclivities of hills." Excellent advice, from one point of view; excellent for checking the rapidity of growth, and improving the quality of the timber, if the trees would but grow there. Unfortunately, the expoſure to wind neutraliſes all the benefit; it laſhes them to death—the cure kills the patient.

The actual growth in this country does not equal that of the tree in the Himmalayas; the average proves to be about 20 feet in height, and about half a foot in diameter every ten years: equal to about 2 feet in height and about three-quarters of an inch in diameter each year. The beſt and largeſt ſpecimens which we know of, are ſome fine trees at Lady Rolle's, at Bicton, near Exeter. Theſe are upwards of 60 feet in height, and are the produce of the firſt ſeeds introduced into this country. At Blenheim Park, in Oxfordſhire, there are trees upwards of 50 feet in height, which alſo no doubt belong to the firſt flight. At Osberton Hall, in Nottinghamſhire, there was a plant 45 feet in height, which, however, was killed by the cold in 1860. At Beechland, in Suſſex, there is a plant 40 feet in height; at Nettlecombe, in Somerſetſhire, one 37 feet; at Linton Park, another 32 feet; and a multitude of others all over the kingdom, varying from 20 to 30 feet. One of the fineſt and beſt grown of the medium ſize that we have ſeen is at Mr Henry Watſon's, Dartington Houſe, near Totnes. At Caſtle Martyr, near Cork, there is a fine specimen 18 years old and 38 feet high. At Dropmore there are a number of plants which have probably been raiſed from the firſt ſeeds. Mr Froſt, as already mentioned, dates them from 1829; we have taken the liberty of reckoning them as only dating from 1832. At any rate, there ſeems no doubt that they have all been raiſed from the ſame ſowing, and their heights are 40 ft., 40 ft. 3 in., 40 ft. 9 in., and 43 ft.; while two others, planted in 1841, are reſpectively 32 ft. and 33 ft. In Scotland, the largeſt or rather the oldeſt trees, as mentioned previouſly (p. 13), are thoſe introduced by the Hon. W. Leſlie Melville at Melville Houſe in Fife, where they exiſt in quantity. Thoſe at Hopetoun Houſe, near Queensferry, and in the Edinburgh Botanic Garden, are of the ſame age. The height of the latter at the preſent date (1865) is 31 feet, with a ſtem 5 feet 6 inches in circumference at 3 feet from the baſe. Mr Spiers at Culcreuch has a tree, planted in 1833, which at ſame date was 30 feet 9 inches high, and its girth at baſe 4 feet 1 inch, and at 3 feet from ground 2 feet 11 inches. We need ſcarcely occupy the time of the reader in enumerating the ſize of ſmaller ſpecimens.

While the plant was yet rare, it ſometimes ſuffered from much cheriſhing. It was thought that its drooping leader would be ſtrengthened by cutting in the ſide branches, or that the plants might be made more ſhapely by tying them up. Both are evil practices, oppoſed to the plaineſt principles of phyſiology. All that ſort of foſtering is impoſſible in large plantations; and we ſee in them how much better the tree proſpers when Nature is left to herſelf. The principle may be correct enough, that if we prune the lower and lateral branches, more vigour will be thrown into the leader. In our own race, we know that if a man has been deprived of one ſenſe, his other ſenſes become ſtrengthened at its expenſe. The ſenſe of hearing in the blind man is preternaturally acute; but who would dream of putting out a man's eyes to improve his hearing? On the ſame principle of reaſoning, why ſhould he ſpoil the lower part of the tree to improve its upper part? There may be, and are in horticulture, many caſes where it is deſirable to invite Nature to improve upon herſelf, but this is not of them. Let us take the tree as it is given to us, and allow it fair ſcope to develop its own properties, and not attempt to give it a form or a character which does not belong to it.

One ſimple expedient for improving the growth of the tree may be noticed. It is to keep the turf cut away round the tree, ſo that plenty of moiſture may reach the roots, and no injury be done by the ſoil being bound. Mr Hollingworth, of Turkey Mill, near Maidſtone, in Kent, has ſome remarkable inſtances of the ſucceſs of this treatment; and as it aſſimilates the condition of the tree to its ſtate in its native condition, there can be no doubt that it is right in principle as well as in practice.

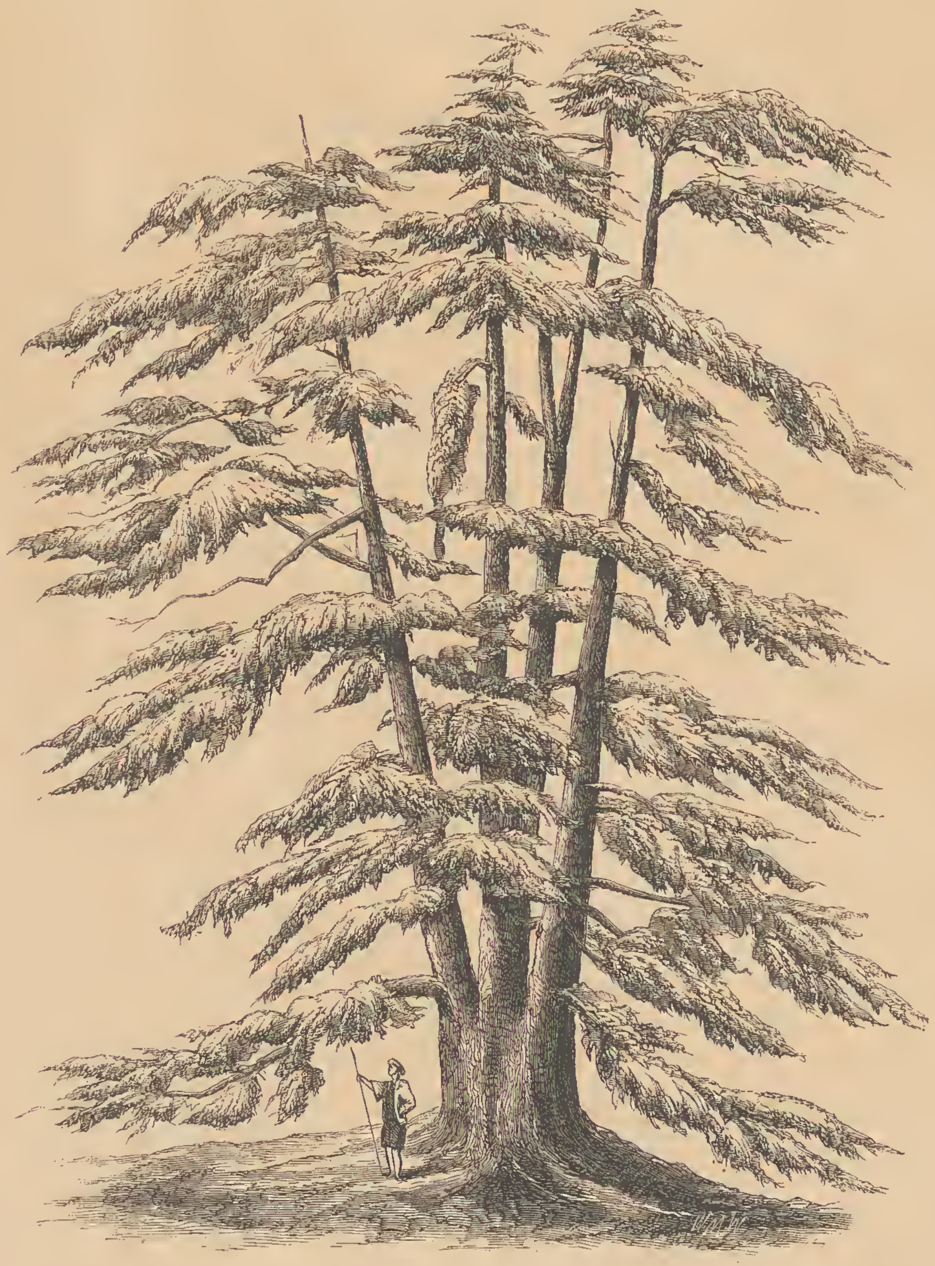
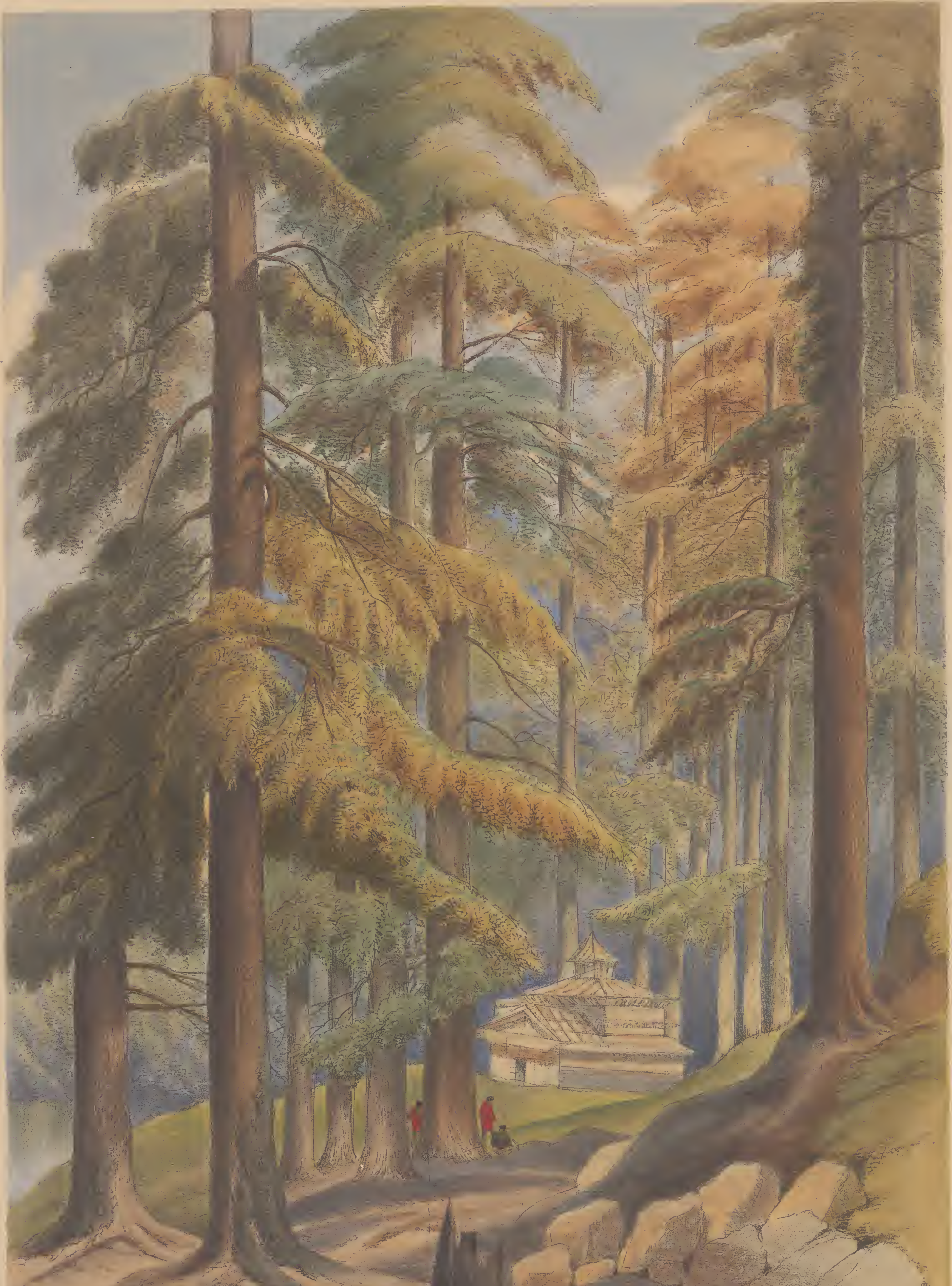


Fig. 12.

The Deodar is not difficult to propagate by cuttings, and it can be readily inarched or grafted upon the Cedar. Grafting the Deodar on the Larch was at one time largely practiſed, and with its varieties this is ſtill ſometimes done. The young plants get ſickly or die off, however, in a few years, unleſs the graft is made ſo low as to allow of its rooting above its union with the Larch. At Kingſton Hall, in Nottinghamſhire, many plants were killed in the winter of 1860, and among them were all the grafted plants. The large ſupply of ſeeds ſo liberally diſtributed by the Eaſt India Company has, however, made plants ſo common in this country, and the example they ſet of importing ſeed has been ſo well followed by private ſpeculators, that there is no need to have recourſe to multiplying plants artificially. We ſhall ſoon alſo have a ſufficient ſupply of ſeed from the young trees growing in this country. Already they have begun to bear fruit, and every year will add to the number of thoſe doing ſo. The firſt ſpecimen in Europe which we have heard of as bearing fruit was a fine tree at Mr Kett Barclay's, at Bury Hill, near Dorking. It fruited in 1852, when the tree was 28 feet high.



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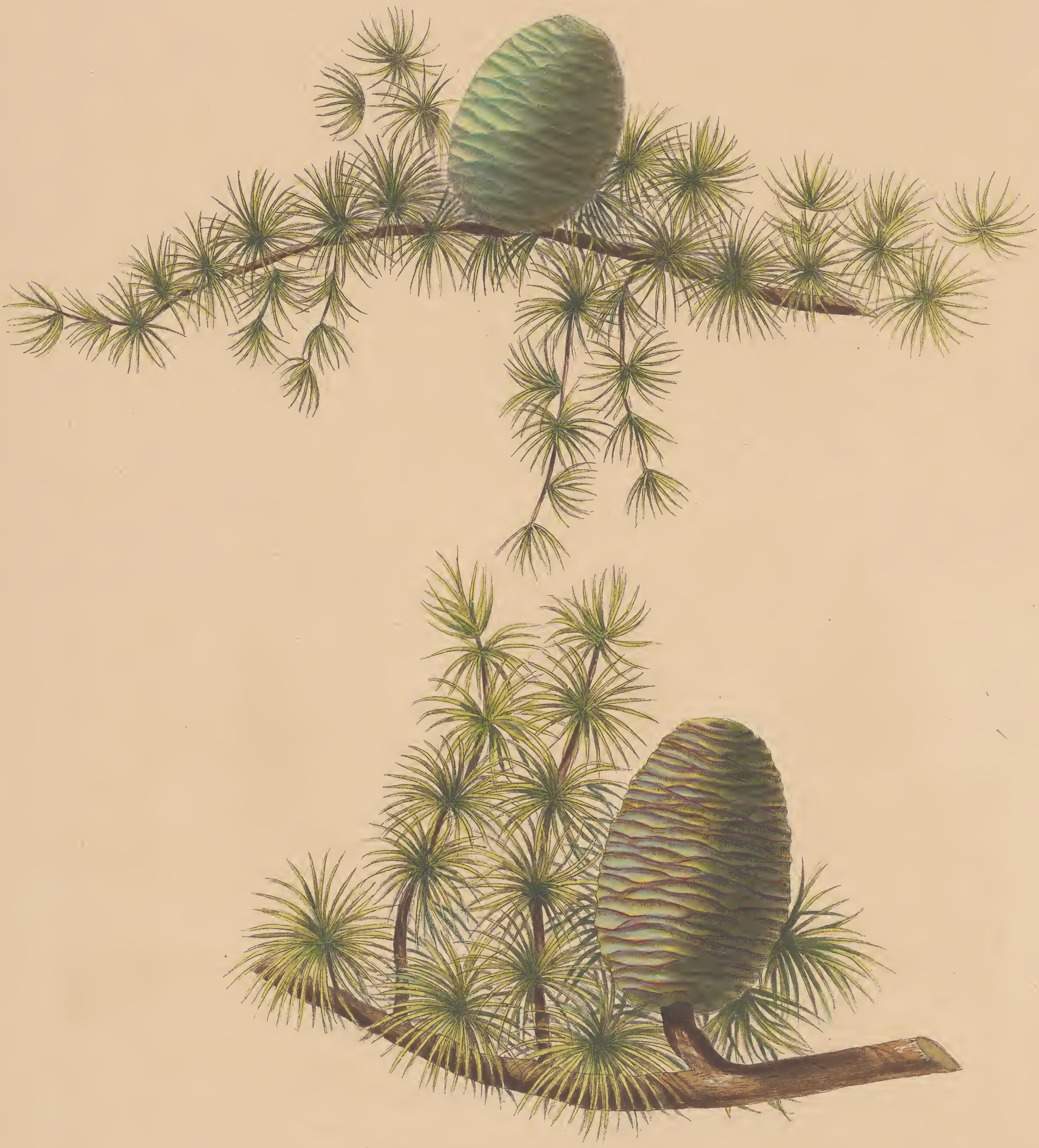
CEDRUS DEODARA,

A GROVE AT NACHAR NEAR THE WATERFALL.

From a Drawing by the late Lady Canning.

42



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I. CEDRUS DEODARA. II. CEDRUS LIBANI.

The next was one in France, mentioned by Carrière as fruiting in 1854. In 1858 one of the trees at Lady Rolle's, at Bicton, bore cones. Since then it has fruited at Dropmore, at Sunning Hill, Knaphill, Chiſwick, and many other places in the ſouth of England. It has alſo produced male catkins, if not cones, at Cubaugh, alſo at Roperton, and in Forfar.

A figure of the young cone of the Deodar, contraſted with that of the Cedar of the ſame age, is given in another of the plates. It will be ſeen that the colouring of the two is different: the ſcale of the cone in the Cedar has a narrow margin of crimſon colour. This is abſent in the cone of the Deodar, and the effect is that the general colour of the latter is conſiderably greener than the former; and, of courſe, cloſe at hand, they can be at once diſtinguiſhed by the preſence or abſence of this crimſon edging to the ſcale. The fragrance of the cone of the Deodar is alſo more powerful than that of the Cedar. We have made theſe obſervations ſince the firſt pages of this paper were printed, having had the opportunity of perſonally examining young cones of the Deodar growing in proximity to thoſe of the Cedar of Lebanon at Chiſwick Houſe. No male flowers of the Deodar could be detected on its branches; but as the male catkins of the neighbouring Cedar were at this time quite young, not ſo large as a ſmall pea, thoſe on the Deodar, if they exiſted, may, from their ſmall ſize, have eluded obſervation: it is alſo poſſible that the female flowers may have been impregnated by the Cedar. It will be intereſting to watch the product of the ſeeds of theſe Deodars, in order to aſcertain whether they ſhew any points intermediate between the Cedar and the Deodar.

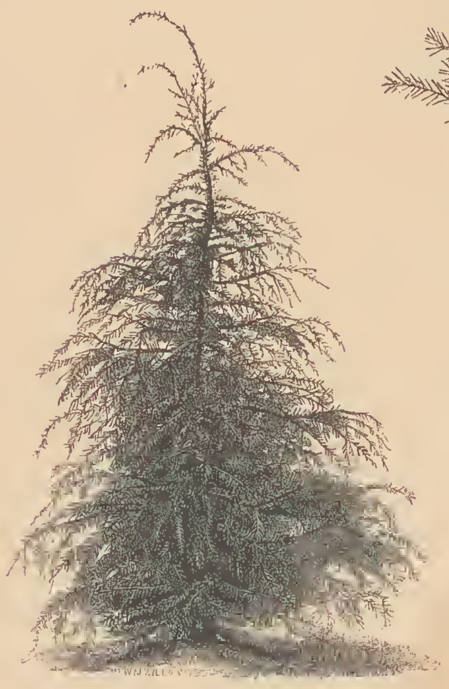


Fig. 13.

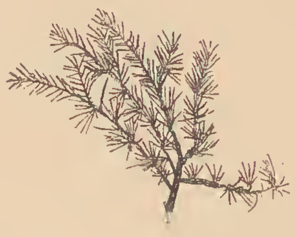


Fig. 14.

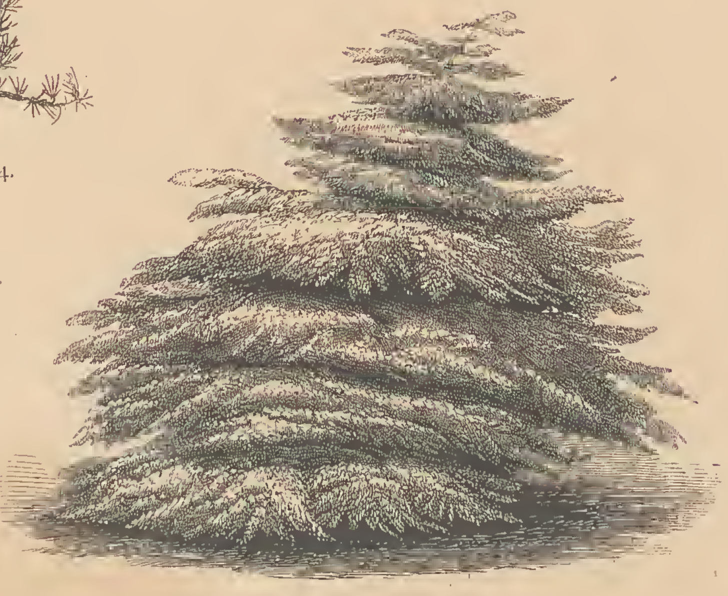


Fig. 15.

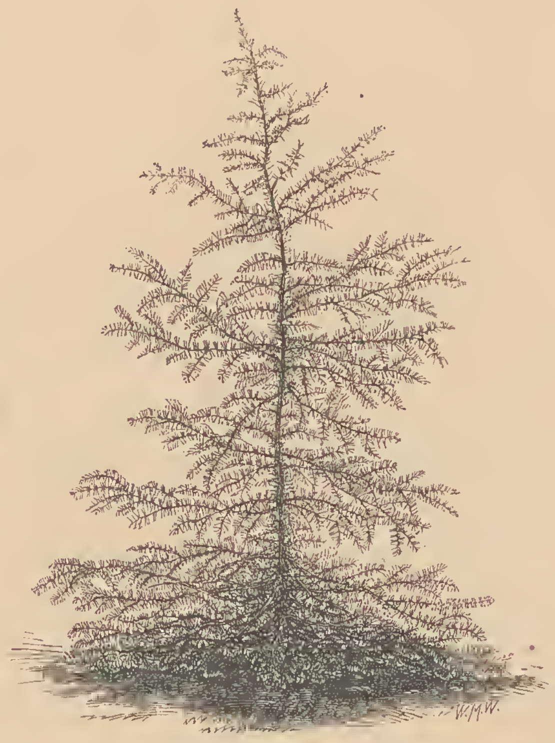


Fig. 16.

The figure of the young Deodar in the coloured plate is a portrait of one of the trees at Bicton.

Portraits of the old tree in its native habitats are given in two other plates. Theſe are due to the liberality of Lady Stuart de Rotheſay, who has kindly permitted them to be copied from ſketches which had been made by her daughter, Lady Canning, during her ſojourn in India. Lady Canning's talent as an artiſt was great, and we were referred to ſketches which ſhe had made of ſpecimens of the Deodar at Simla and on the Sutlej, as the beſt he had ſeen, by a friend in India to whom we had written for a good portrait of the Deodar in its native mountains. On applying to Lady Stuart de Rotheſay, ſhe moſt kindly gave permiſſion to copy whatever we thought neceſſary for the purpoſes of this work. We have ſelected a view of a Deodar grove at Simla, well known as a favourite ſpot for pic-nic parties, and of a curious twin Deodar of enormous ſize, alſo near Simla. The woodcut [fig. 12] is a portrait of a tree 80 feet in height growing near Srinagar (Kaſhmeer), for which we are indebted to Mr Spiers of Culcreuch, who received it from Mr Vigne, by whom the tree was ſketched. The tail-piece [fig. 23] is copied from part of an admirable photograph of two trees in Nachar Foreſt in the valley of the Sutlej, which was kindly ſent us by Dr Hugh Cleghorn, Conſervator of Foreſts in the Madras Preſidency.

The difference between the character of theſe aged trees and the elegant drooping form of the young tree in its early prime (as ſhewn in the plate of tree at Bicton Park) is very marked; but there is a diſtinctive character even in the young plants not long freed from the thraldom of the nurſery. Fig. 13 is a portrait of a young Deodar, and fig. 14 of one of its branches. Fig. 15 is that of a young Cedar of Lebanon; but it is fair to ſay that it is not everywhere that it would aſſume this form at an early age. In the cooler parts of Scotland it would be more like the upper half of fig. 16, but more ſtunted. Fig. 16 is a young *Cedrus Atlantica.*

Aſcending to a ſtill earlier age (viz., the firſt appearance of the plant at all, the ſeed leaves), we find a certain amount of difference, but unhappily it is not conſtant. Still we have given figures of theſe leaves (natural ſize) ſelected as near as poſſible to repreſent a fair average. Figs. 17 and 18 ſhew the embryonic leaves in *C. Deodara* in an individual which had eleven of them. Figs. 19 and 20 ſhew one of *C. Libani* in which there are only nine; and figs. 21 and 22 a plant of *C. Atlantica,* in which alſo there are only nine. It would not be ſafe from this to aſſume that the normal number of cotyledons in *C. Libani* and *C. Atlantica* were only nine, while in *C. Deodara* they are eleven; but it would be fair to gueſs that in the latter they would be more frequently found eleven than in either of the former.

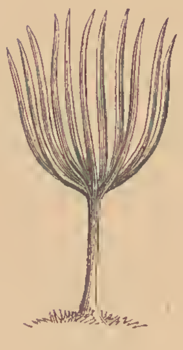


Fig. 17.

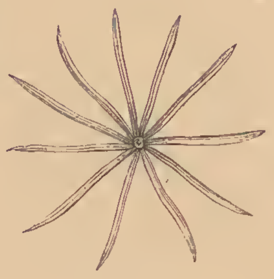


Fig. 18.

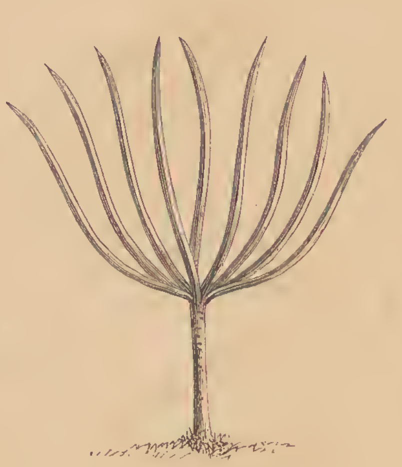


Fig. 19.

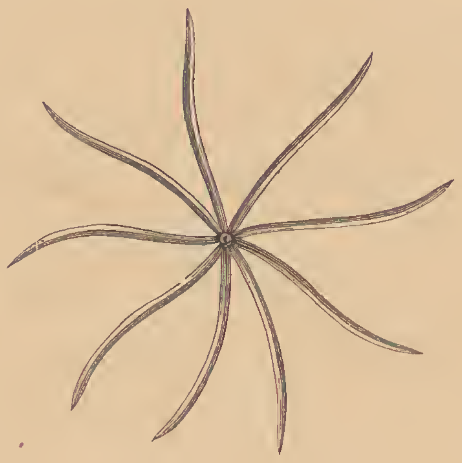


Fig. 20.

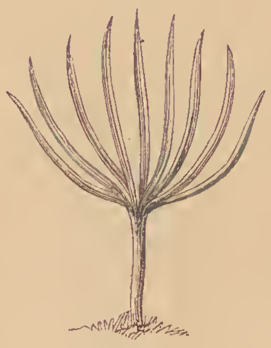


Fig. 21.

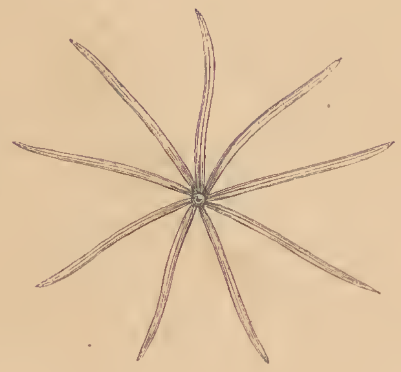


Fig. 22.

*Commercial Statiſtics.*—In 1838, the price of a young plant 3 to 4 inches was 21s., and from 6 to 12 inches, 42s. In 1843, plants 6 to 9 inches coſt 7s. 6d., and from 3 to 4 inches, 5s. each. In 1847, ſeedlings 2 to 3 inches were 1s. 6d.; from 4 to 6 inches, 5s.; grafted plants 2 to 2½ feet, 10s. each. In 1858, ſeedlings 6 to 9 inches coſt 90s. per 100; 2½ feet, 5s. each; 6 feet, 42s. In 1864, the price of ſeedlings was as follows: 1 year, 50s. per 100; 1 to 2 feet, 1s. 6d. each; 3 to 4 feet, 5s.; 6 feet, 17s. 6d.; 10 feet, 31s. 6d. The price of ſeed in 1864 was 20s. per lb.

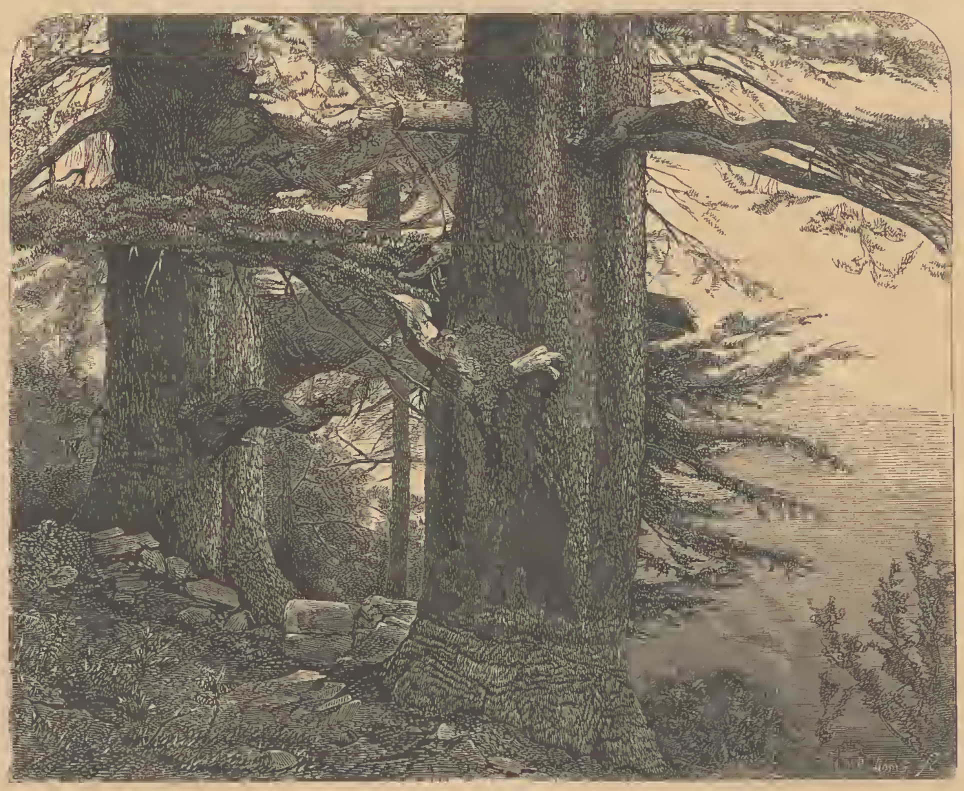
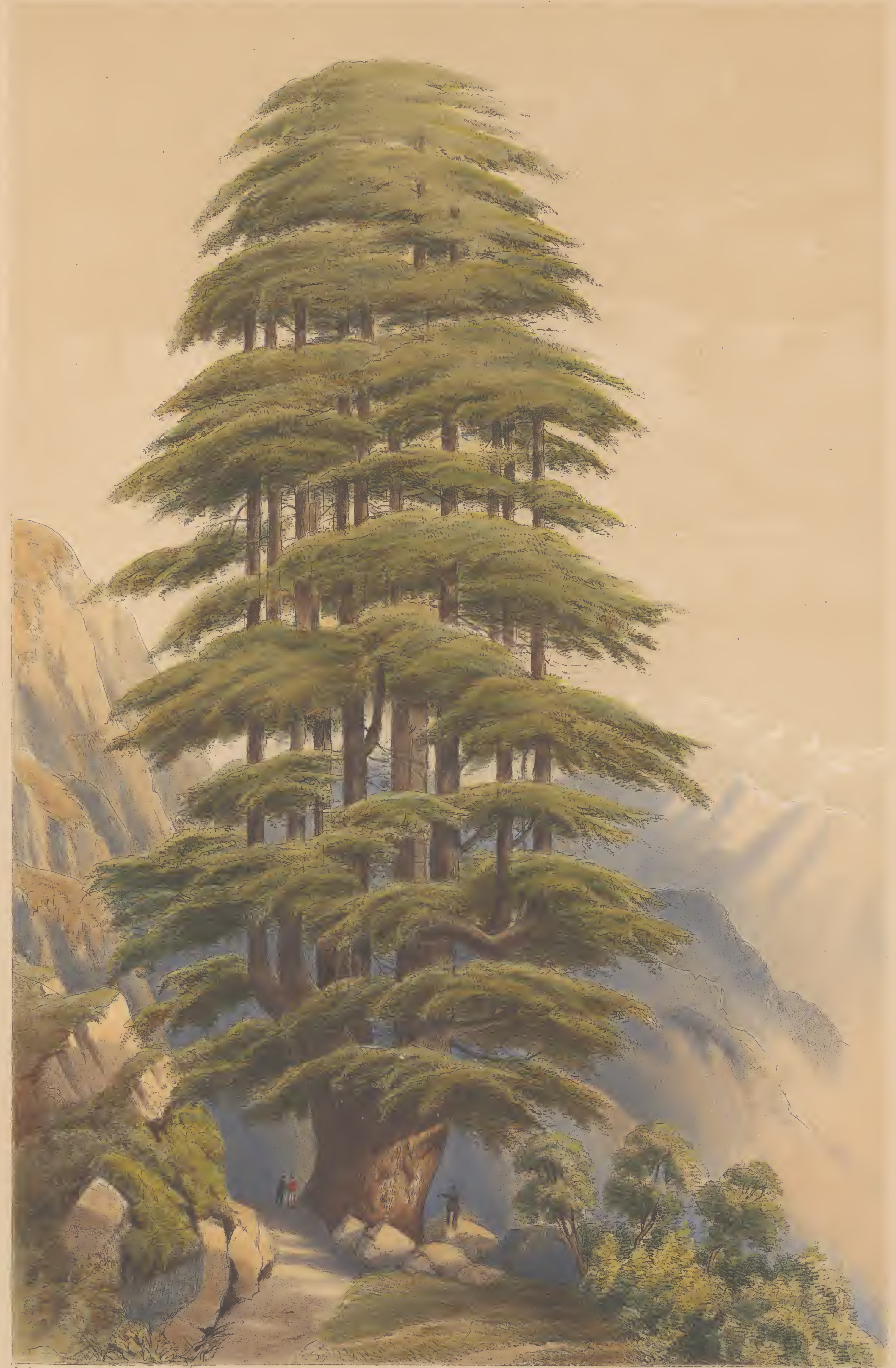


Fig. 23. *C. Deodara,* reduced from a Photograph taken in Nachar Forest, in the Valley of the Sutlej.



On Zinc by W. Richardson.

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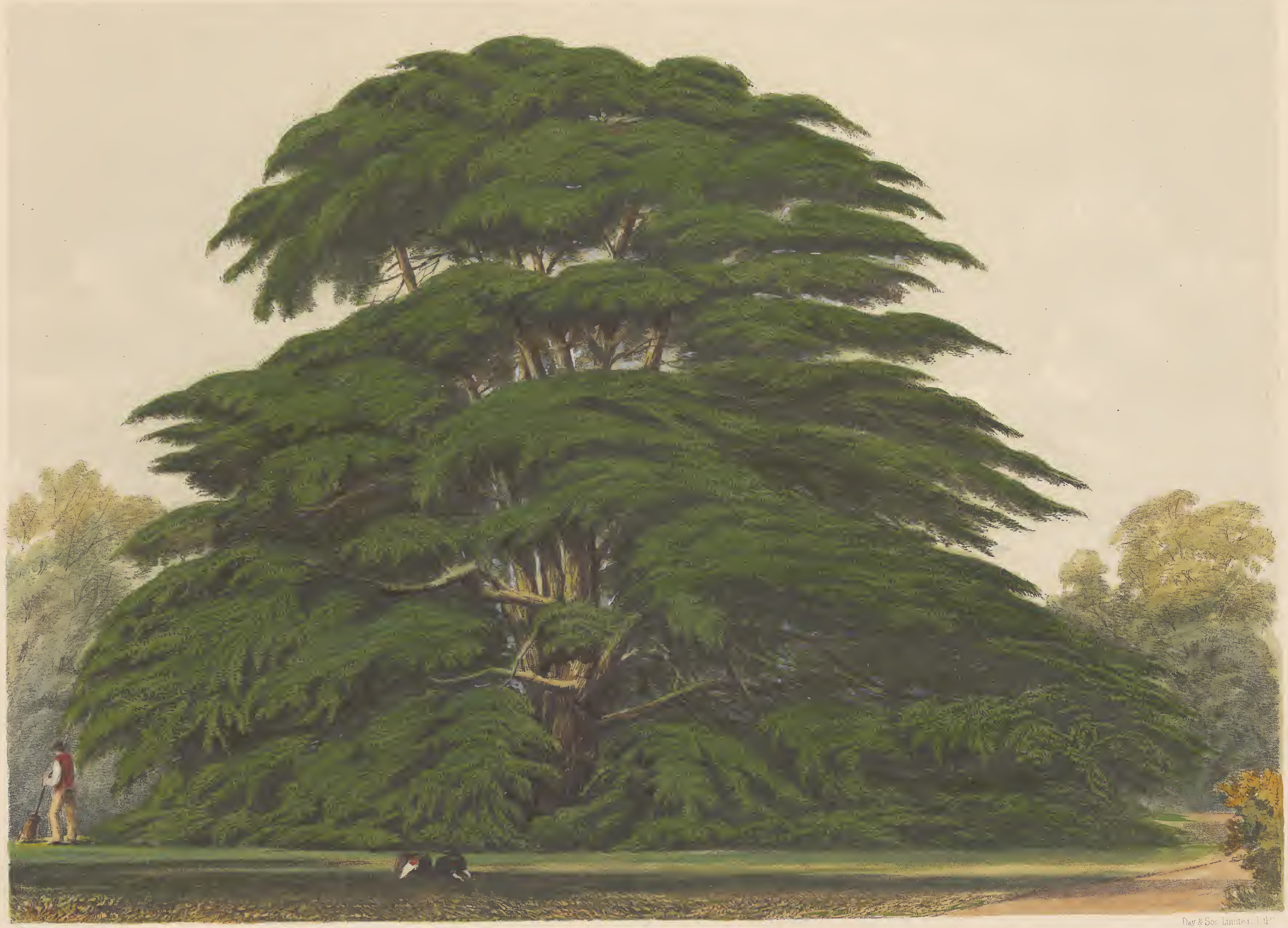
CEDRUS DEODARA

AT NACHAR.

From a Drawing by the late Lady Canning.



W Richardson del.

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C.EDRUS LIBANI.

# CEDRUS LIBANI

IDENTIFICATION.—ארז 2 *Sam.* v. 11, and 2 *Chron.* ii. 8, *et seq.*

CEDRUS MAGNA s. CEDRELATE, Plinius, *Hist. Nat.*, xiii. cap. 11, xxiv. cap. 11 (*ed. princeps*, 1469).

Κέδρος Θαυμασὴ ἐν Συρία, Theophr. *Hist.*, v. cap. 8 (1513).

ALTA CEDRUS, Belon, *Conif.*, p. 3 (1553).

CEDRUS, Belon, *Conif.*, p. 162 (1553); Trew in *Nov. Act Phys. Med. Acad. Cæsar. Leop. Carol. Norimbergiæ*, vol. i. pp. 409–437 (1757), *et* vol. iii., App., p. 445 (1767); Trew, *Cedrorum Libani Hist.* (1756 and 1767).

CEDRUS PHŒNICEA, Reneaulm. *Specim.*, p. 27 (1611).

CEDRUS MAGNA SIVE LIBANI CONIFERA, J. Bauhin, *Hist.*, i. p. 277 (1650).

CEDRUS CONIFERI FOLIIS LARICIS, C. Bauhin, *Pinax*, p. 490 (1671).

LARIX ORIENTALIS FRUCTU ROTUNDIORE OBTUSO, Tournef., *Instit.*, p. 586 (1700).

CEDRUS LIBANI, Barrelier, *Ic.*, p. 499 (1714); Loudon, *Arboret. Brit.*, iv. p. 2402 (1838); Forbes, *Pinet. Woburn.*, p. 145 (1839); Loudon, *Encycl. of Trees*, p. 1056 (1842); Spach, *Hist. Nat. Veg. Phaner.*, xi. p. 427 (1842); Link, *Abiet. Hort. Reg. Bot. Berol*, in *Linnæa*, xv. p. 538 (1841); De Chambr., *Trait. Prat. des Arbres Resin.*, p. 308 (1845); Loiseleur Deslongchamps, *Hist. du Cèdre du Liban.* in *Ann. Agr. Franc.*, 3rd Ser., xix. p. 358 (1837), and xx. p. 65 (1837); Knight, *Syn. Conif.*, p. 42 (1850); Robinson's *Biblical Researches*, iii. p. 598 (1855); Carrière, *Traité des Conif.*, p. 283 (1855); Gordon, *Pinetum*, p. 43 (1858); Hooker in *Nat. Hist. Rev.*, p. 1 (1862); Balfour, *Plants of the Bible*, p. 7 (1857); Dunn, *Nat. Hist. of the Bible* (1865); Tristram, *Land of Israel*, p. 624 (1865); Henkel and Hochstetter, *Synops. d. Nadelhölzer*, p. 144 (1865); Veitch, *Manual of Coniferæ*, p. 137 (1881).

LARIX CEDRUS, Miller, *Dict.*, No. 3 (1724); Desfontaine, *Hist. Arbr.*, ii. p. 597 (1809).

PINUS CEDRUS, Linn., *Spec.*, p. 1420 (1774); Lambert, *Genus Pinus*, ed. 1, i. p. 58 (1803), ed. 2, ii. p. 89 (1828); Antoine, *Conif.*, p. 55 (1840–46); Endlicher, *Syn. Conif.*, p. 136 (1847); Parlatore in D. C. *Prod.*, xvi. 2, p. 407 (1868).

ABIES CEDRUS, Poiret, *Dict.*, vi. p. 510 (1804); Loiseleur, *Nouv. Duhamel.*, v. p. 287 (1801–1819); Richard, *Conif.*, p. 62 (1826); Lindley in *Penny Cyclopædia*, i. p. 33 (1833); Lindley and Gordon, *Journ. Hort. Soc.*, v. p. 214 (1850).

LARIX PATULA, Salisbury in *Linn. Trans.*, viii. p. 314 (1837).

CEDRUS PATULA, Koch, *Dendrologie*, vol. ii. p. 268 (1873).

ENGRAVINGS—*Cones* and *Leaves.*—Belon, *op. cit*; Trew, *op. cit.*, 1756, t. 8 *et* 9, and 1767, t. 13, f. 1–7; Loiseleur Deslongchamps, *op. cit.*; Loudon, *Arboretum*, *loc. cit.*, iv. f. 2267, and viii. pl. 396 and 399; Loudon, *Encycl.*, *loc. cit.*, fig. 1974; Lambert, *Genus Pinus*, ed. 1, *loc. cit.*, t. 37, ed. 2, *loc. cit.*, t. 51; Antoine, *Conif.*, *loc. cit.*, t. 22, fig. 1; Richard, *op. cit.*, t. 14 *et* 17.

*Trees.*—Belon, *op. cit.*, pp. 360 and 370; Kennyon's *Essay on Trees*, p. xlv. (1815); Strutt's *Sylva Britannica* (1826); Loiseleur Deslongchamps, *op. cit.*; Loudon, *Arboretum*, iv. *loc. cit.*, pp. 2404–2425, figs. 2268–2282, and viii. pl. 396–400; Balfour, *loc. cit.*; Dunn, *loc. cit.*, *cum multis aliis.*

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*Specific Character.*—Cedrus sæpius habitu tabulæformi, ramulis patulis, strobilis apice umbilicatis seminum alis basi abrupte truncatim expansis. Habitat in Syriæ, Libani, Amanae, Tauri montibus.

*Description.*—A large wide-spreading tree, of from 50 to 80 feet in height, subject to much variation in habit, but normally with the branches tabularly disposed. The bark is greyish brown. The branchlets are disposed in a flat, fan-like manner, and thickly covered with tufts of stiff leaves (fig. 1). Their colour varies in different individuals, specimens of all shades occurring from yellowish to dark and bluish green, very generally with a glaucous tinge. The leaves remain two years on the branch. The number of leaves in a full-sized tuft is about 30, but fewer in smaller tufts. They are clustered in whorls, and there is no doubt that the tufted whorls are merely the leaves belonging to a bud or shoot whose growth is arrested, and which, had it been produced, would have been disposed singly, as we see in the young terminal branches whose growth is not arrested; or, as Loudon expresses it, the buds from which they spring have the appearance of abortive shoots, which, instead of becoming branches, only produce a tuft of leaves pressed closely together in a kind of whorl. These buds continue for several years in succession to produce every spring a fresh tuft of leaves placed within those of the preceding year; and thus each bud may be said to make a slight growth annually, but so slowly that it can scarcely be perceived; hence many of these buds may be found on old trees, which have eight or ten rings, each ring being the growth of one year; and sometimes they ramify a little. The leaves (fig. 2) are from one to two inches in length, quadrangular and needle-shaped, and their margins entire, smaller at the base and apex than in the middle, and they rest upon phyllulæ as in Spruce Firs (fig. 3). They have usually about three rows of stomata on each of the four sides (fig. 4); but these stomata are sometimes not apparent, or at least not easily seen on one or other or both of the two upper sides. The transverse section of the leaf (fig. 5, plan) shews the presence of thick hypoderm and of two resin canals on the under surface near the epidermis; and the structure of the leaf is the same in *C. Atlantica* and *Deodara.* The flowers appear in the month of August, and are produced from the midst of the tufts of leaves. The male catkins (fig. 6) are from one and a half to two inches in length, tapering, curved, growing upwards: when the tree flowers freely, they appear in great numbers, so as quite to clothe the branchlets on which they grow. They are composed of many sessile flowers (figs. 7, 8, and 9), imbricated round a common axis; and each consists of what is called the crest of the anther, with two sessile stamens at its base united along the middle, making what is called a bilocular anther. The crest, when young, is crimson brown, and the stamens yellow or greenish; when older, the whole male flower is reddish brown. The pollen is yellow and plentiful; the grains usually globular, and rather large. The female catkins, when young, are short, erect, broadly ovate, and purple (fig. 10). If examined at an early stage, they will be seen to be composed of scales and bracts. At the earliest stage of all, doubtless, the bract, which, like the crest of the anther in the male flower, is equivalent to the petal, will be first visible: the scale, however, soon takes precedence, as shewn in fig. 11. On the other (the inner) side of the scale, the two seeds are at first provided with a two-eared mouth or opening, with an ear on each side, as in fig. 12. That figure is copied from Lambert's "Genus Pinus"; and it is interesting to

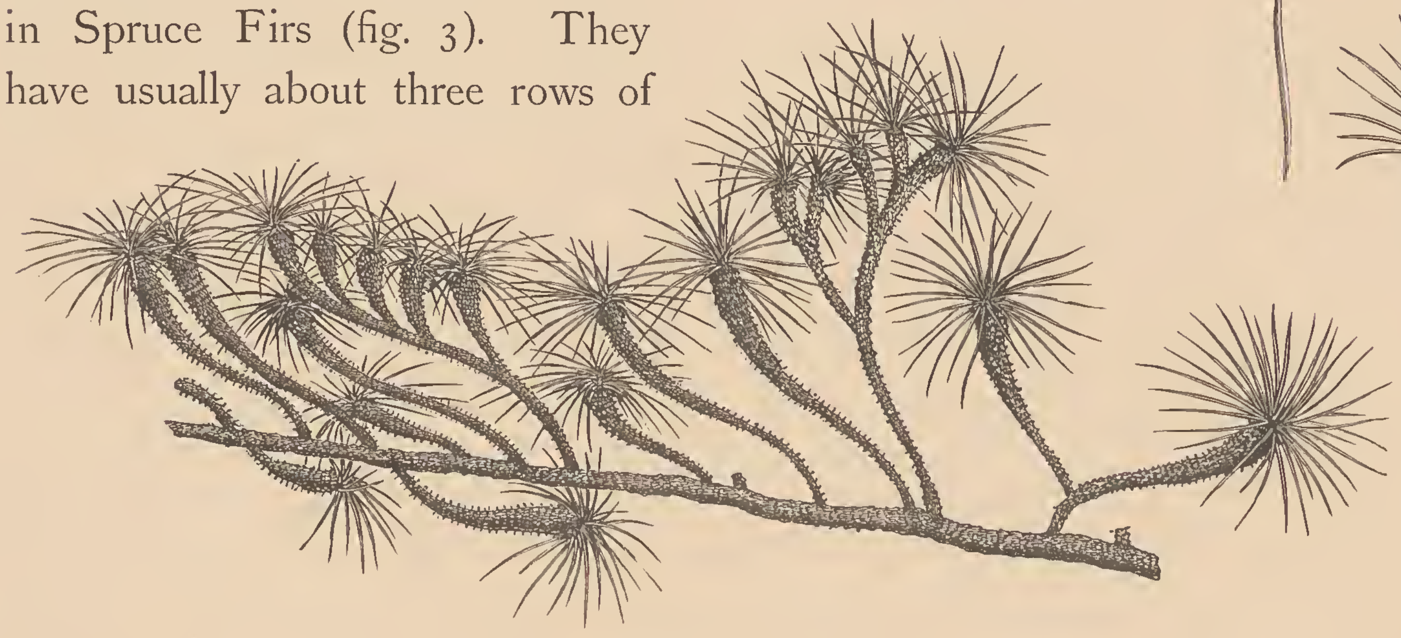


Fig. 1.

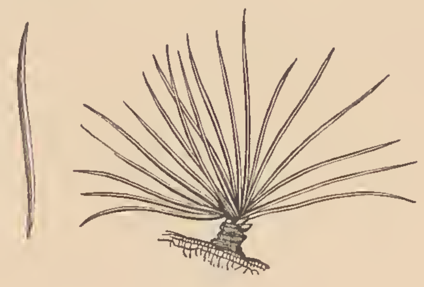


Fig. 2.

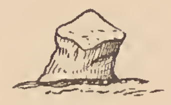


Fig. 3.

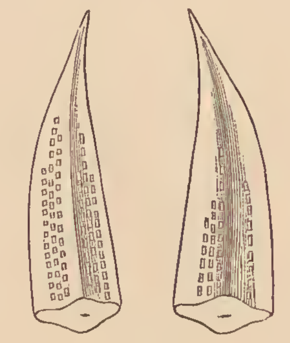


Fig. 4.

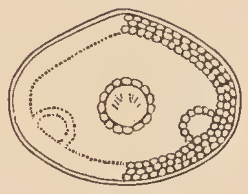


Fig. 5.

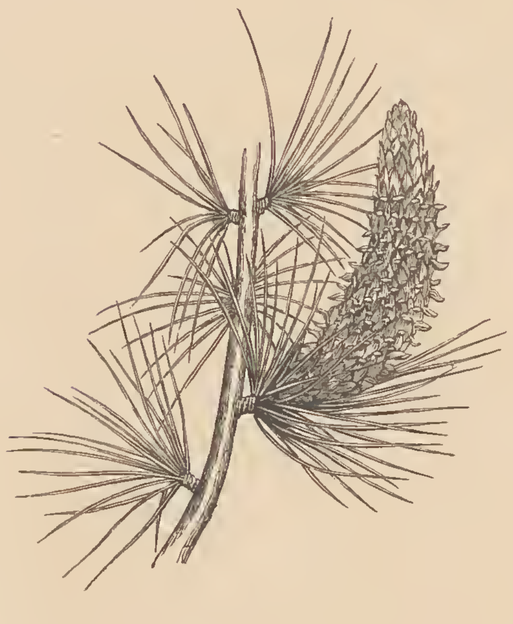


Fig. 6.

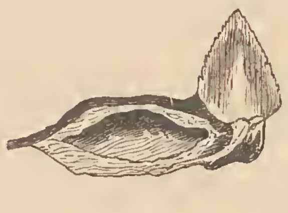


Fig. 7.

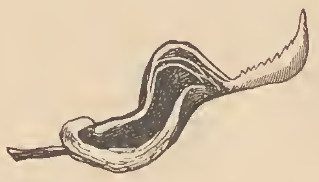


Fig. 8.

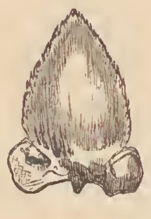


Fig. 9.

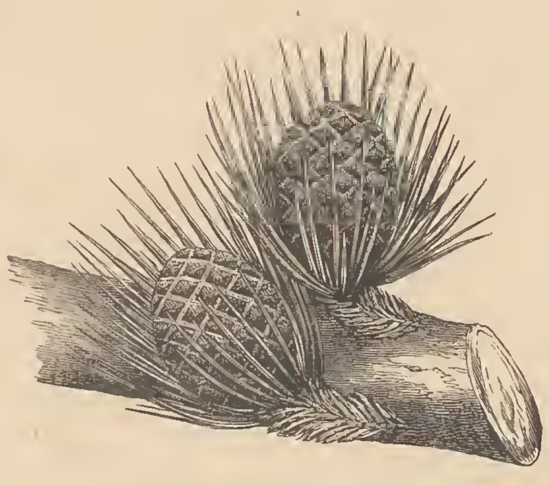


Fig. 10.

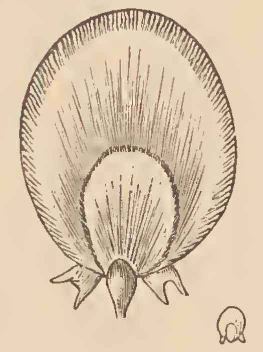


Fig. 11.

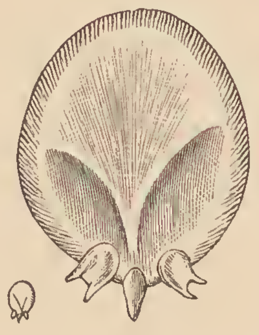
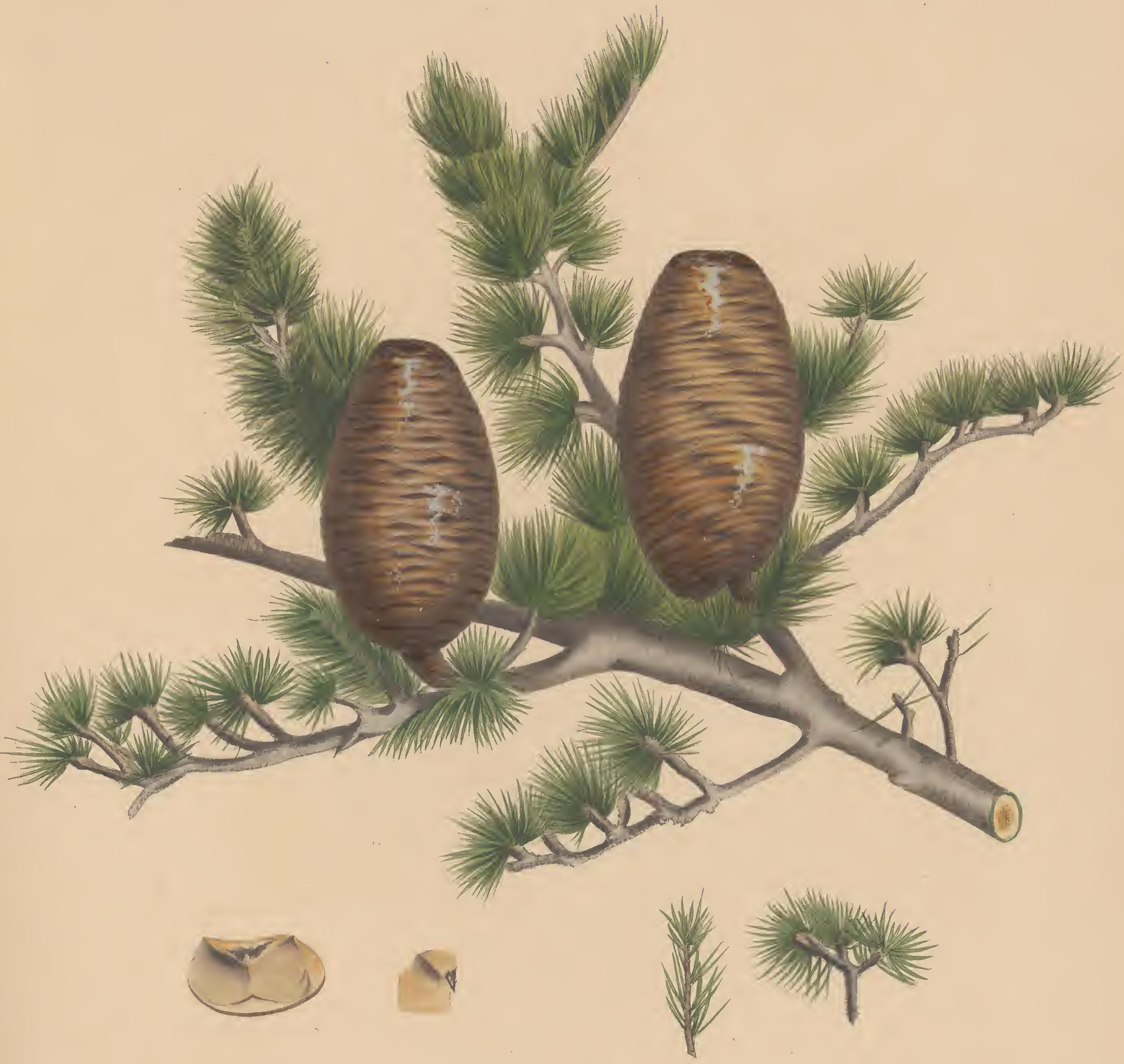


Fig. 12.



to find there portrayed the early appearance of the ovule exactly as it was published by M. Baillon in 1860 (Baillon in *Annales des Sciences*, 4th ser., tom. xiv. p. 186), from his more modern researches. Fig. 13 is copied from that author's paper in the *Annales des Sciences*, "On the Female Organs of the Coniferæ." It represents the early stage of the seed of *Pinus resinosa*, and shews exactly the same thing as was shewn by Lambert in fig. 12, viz., that, at an early stage, the pistil exists in the form of two projections or ears, which obviously at first perform the part of a stigma, and afterwards are developed into a pericarp protecting the seed. It is true that the right interpretation of what he saw and figured was not understood by Lambert; but the accuracy of his observation remains wholly to his own credit, while his blindness to the true meaning of the facts observed was shared by all his contemporaries, and most of his successors down to the present day. When the female catkin is more advanced, it becomes developed into a large, handsome, erect, oblong-ovate subcylindrical cone, about 2½ to 5 inches in length. That portion of the young scales which is of a purple colour is not increased in breadth, but, retaining its former breadth, is expanded along the margin of the scale and weakened in intensity, becoming red, and even in some cases thinning off altogether, leaving only a brownish semi-transparent or yellowish membranous edge: this manner of its expansion seeming to shew that the growth by which the increase of size in the scale is attained takes place not equally all over the scale, but farther down than its apex. The rest of the scale, behind this reddish margin, is green until mature, when it becomes greyish brown; but at all stages it has a peach-like bloom upon it, which is due to its texture, which is wholly pubescent, and in some parts exaggerated into woolliness. The scales (fig. 14) are coriaceous, with a double fine core of ligneous fibres on each side: they spring horizontally from the axis, and after about half an inch rise vertically, as shewn in fig. 15. They are thin, broad, obtuse, and truncate at the summit along their whole extent, making their upper margin nearly a straight line, which, as already mentioned, is red or pale pink, and semi-transparent at the edge. Under the microscope, the pubescence, which gives the surface the peach-like bloom, is seen to be composed of transparent, glassy, short, rather thick, curved cylindrical hairs, rounded at the apex, which, again, are the continuation of the cells, which traverse and compose the greater part of the substance of the scale, and where they break forth, as at the back of the scale near the base, form its reddish, woolly, or villose clothing. The surface of the scale where the pubescence is absent is covered with papillæ, which are the terminations of these hairs undeveloped. By the time that the cone is mature, the bract at its back has been thinned out into a mere ragged scurf. See the base of fig. 16. Above the bract at the angle, where the scale turns from horizontal to vertical, there is a good deal of the pale reddish or fawn-coloured semi-transparent woolly pubescence just mentioned. The cells, which, left loose at the back, form this woolly pubescence, are equally numerous on the inner side, but there they are mostly folded up, so as to make a kind of prominence. Each scale supports two seeds, closely packed on the base of its inner side, and with a broad membranous wing (fig. 17), which springs abruptly at right angles from the seed, and is also bent at right angles like the scale itself. The base of the wing enfolds the whole of one side of the seed, and a small part of the other side. The seeds (fig. 18) are irregularly triangular and resinous, pale fawn-coloured, as are the wings. The scales do not readily fall from the axis. It is only after remaining a second year, or even three or more years, on the tree, that they fall off, leaving the core standing erect attached to the branch, as in the Silver Firs. The whole of the cone is resinous when green, less so when mature.

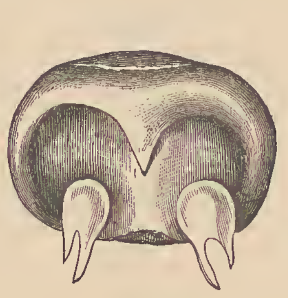


Fig. 13.

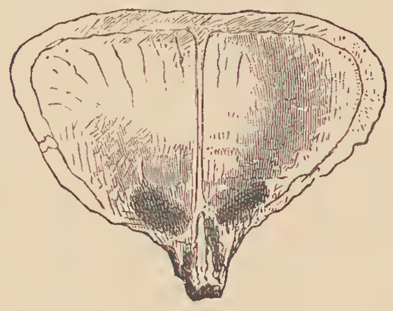


Fig. 14.

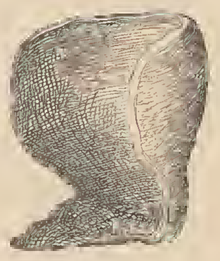


Fig. 15.

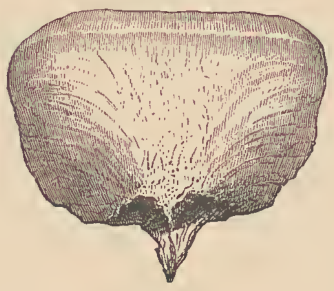


Fig. 16.

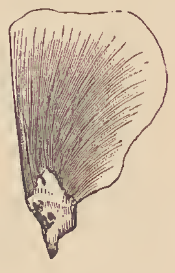


Fig. 17.

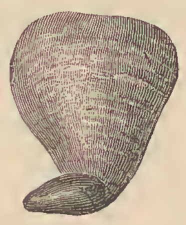


Fig. 18.

The affinities of the Cedar are very interesting. Its cone is that of a Silver Fir; the whole of its structure, as the pubescent scales, the seeds, and their wings, corresponding in shape, arrangement, and texture with those of that tree. So does the bark of the trunk and the timber itself. On the other hand, the leaves are those of a Spruce or Larch, being acicular, quadrangular, and standing upon pulvini or cushions, as in the Spruces, and not flat and without cushions, as in the Silver Firs. It more resembles the Larch, too, in general appearance, in the tuftiness of its foliage, and the mode of growth of the leaves on the branch. At first sight the strong ligneous attachment of the scales to the axis seems to indicate an affinity to the Spruces; but this attachment is not permanent; the scales by and by fall off, as in the Silver Firs, only more tardily, leaving the core standing erect. This never happens with the Spruces or Larches. In them it is the cone itself which falls off. The coincidences with the Spruces and Larches, moreover, are of less importance than those with the Silver Firs, the latter occurring in the reproductive organs, which are always properly regarded as of primary importance. Although allied to both, the Cedar thus is truly a Silver Fir.

The female catkins begin to shew themselves in October, or even earlier, but the cones do not appear until the next year, and, as already said, remain upon the tree usually until the second, but sometimes until the third, year after, or, according to Loudon, several years after. It is said that some trees produce only male catkins, others only female, and some both. The latter is the more usual case. In this country the trees rarely begin to bear until they have attained at least 25 or 30 years of age: usually a good deal more.

When the leading shoot of the Cedar is broken, it does not readily form another; and when it does not do so it ceases to grow in height. Loudon adduces, as an instance of this, that the Cedar in the Jardin des Plantes, which lost its leader at the commencement of the French Revolution, has not increased in height since, but largely in spread of branches. We know one fine tree, which lost its top through the after-dinner folly of its owner, or of one of his friends, who undertook to hit it with a rifle bullet from the dining-room window. He succeeded, cutting off the leader; and, ever since, the magnificent tree remains without a top. This incapacity to push out a new leader, however, chiefly applies to it after it has attained maturity, and assumed its settled form.

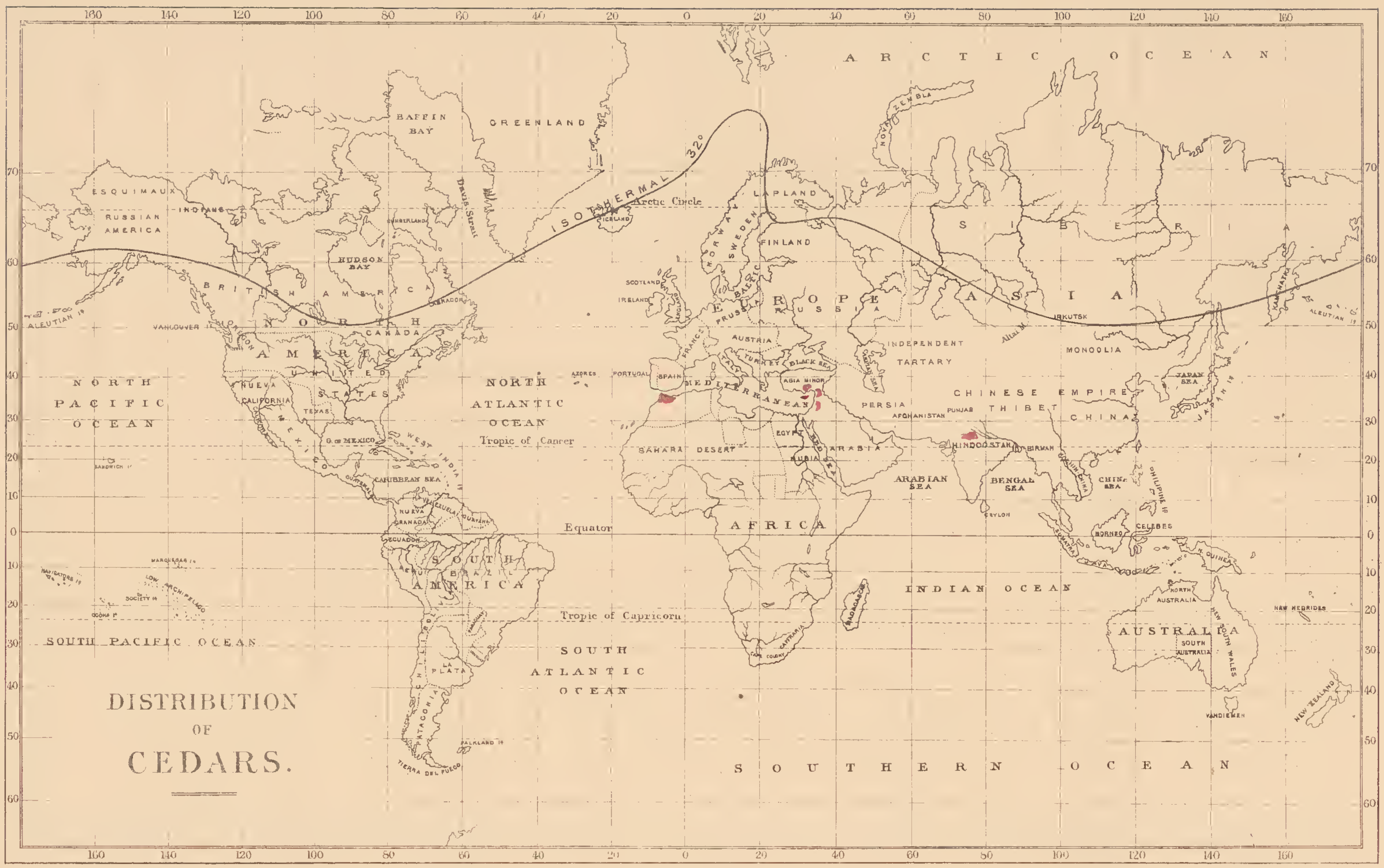
In describing the Deodar, we have discussed the question whether that tree is distinct from the Cedar of Lebanon and the *Cedrus Atlantica* or not. We need not repeat the arguments we there used, but may merely remind the reader that these three forms of Cedar are so like each other that it is difficult to say whether they are distinct species or only varieties of the same. We may, however, repeat what Sir Joseph Hooker says (*Natural History Review* for 1862, p. 17), who very accurately points out the true nature of their relationship, although it may not be easy to say whether he most inclines to hold them as species or varieties. He says—

> "From what has been said respecting each of the three Cedars, it is evident that the distinctions between them are so trifling, and so far within the proved limits of variation of Coniferous plants, that it may reasonably be assumed that all originally sprang from one. It should be added that there are no other distinctions whatever between them—of bark, wood, leaves, male cones, anthers, or the structure of these, nor in the mode of germination or duration, the girth they attain, or their hardiness (the assumed distinctive characters between the Deodar and Lebanon Cedar that were founded on the form of the cones, the falling away of their scales, the shape of the leaf in section, the wood, its odour and durability, having all been satisfactorily disproved long ago). Also, that all are very variable in habit; so much so indeed is this the case with the Deodar, which is the most distinct of all in habit, that though it was not introduced much more than thirty years ago, there are already five distinct varieties sold by nurserymen, some as stiff, others as dark-coloured, and others as short-leaved as the Lebanon Cedar. Also, that though the differences in the scales and seeds of *Deodara* and *Libani* are very marked, they vary much; many forms of each overlap, and further transitions between the most dissimilar may be established by intercalation of seeds and scales from *C. Atlantica*. . . . My own impression is, that they should be regarded as three well-marked forms, which are usually very distinct, but which often graduate into one another, not as colours do by blending, but as members of a family do by the presence in each of some characters common to most of the others, and which do not interfere with or obliterate all the individual features of their possessor. Moreover, I regard them as in so far permanently distinct plants, that though all sprang from one parent, none of them will ever assume all the characters either of that extinct parent, or of the other two forms."

This, according to our notion, is a very fair description both of what constitutes a closely-allied species, and, to a certain extent, of how a species originates.

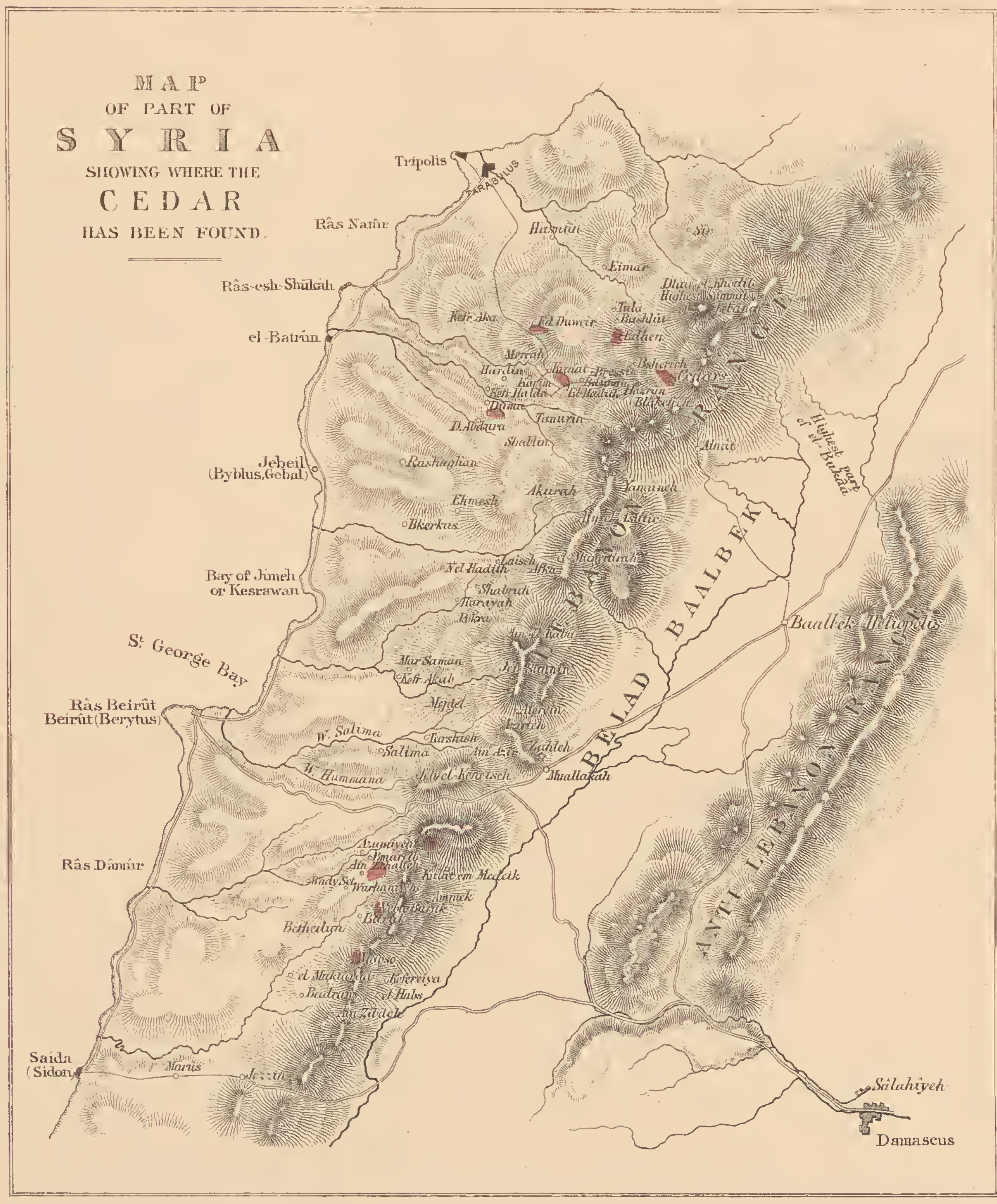
For an estimate of the value of the different characters which distinguish, or have been supposed to

distinguish,



## DISTRIBUTION OF CEDARS.

Vincent Brooks, Day & Son, Lith. London, W.C.

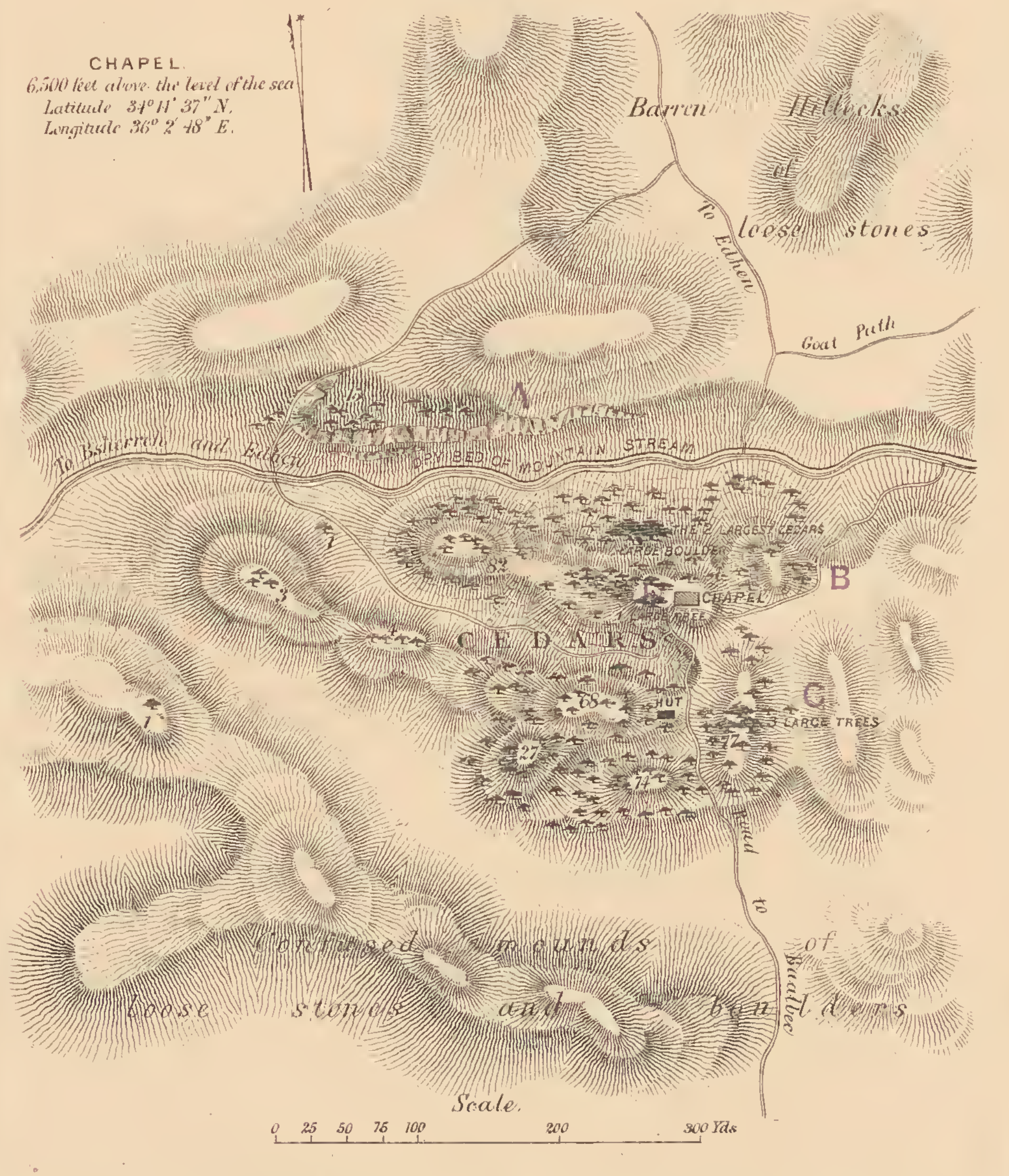


## MAP OF PART OF SYRIA SHOWING WHERE THE CEDAR HAS BEEN FOUND.

REDUCED COPY OF

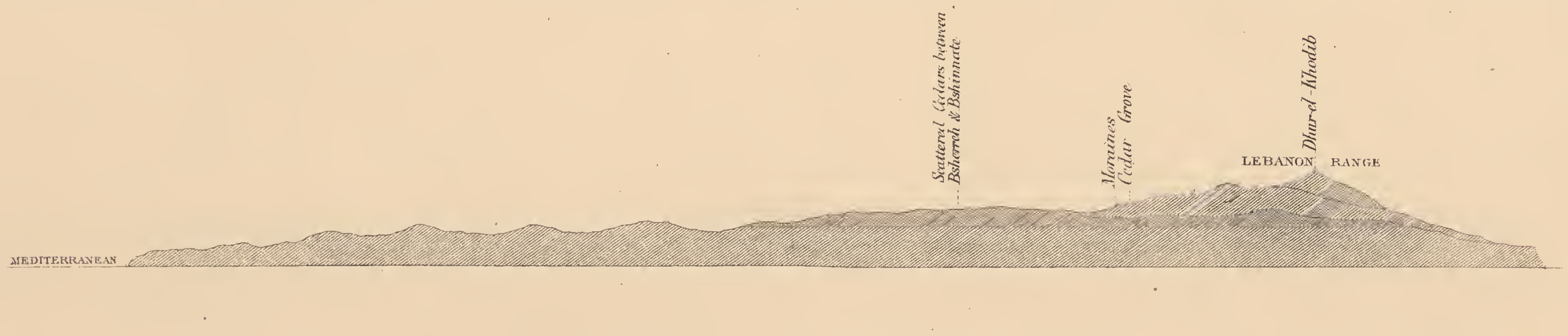
## PLAN OF THE CEDARS OF LEBANON

Surveyed by
COMMANDER, A.L. MANSELL R.N.
H.M.S. "FIREFLY."
JULY 1861.



*The Figures indicate the number of trees in each group. The trees are about 400 in number of all sizes The girth of the largest, at 5 feet above the ground, was found to be 40½ feet; there are only eight trees above 20 feet in girth.*

Vincent Brooks, Day & Son, Lith. London, W.C.



distinguish, these three Cedars from each other, we must also refer to what we say under the Deodar. The most distinctive of these are the tabulated form of the Lebanon Cedar, the red margins to the scales of its cones when green, the broader and more abruptly expanded wing of the seed; and the fewer rows of stomata on the leaves; but none of these are constant, and, consequently, none of them can be absolutely relied on; but, at least, it is very unlikely that a deviation from the ordinary character should take place in them all at the same time. Fig. 19 shews the relative form (copied from Sir Joseph Hooker's paper) of the expansion of the wing of the three Cedars: the thick line shews that of the Cedar of Lebanon, the shaded line that of the Deodar, and the dotted line that of the Atlas Cedar.

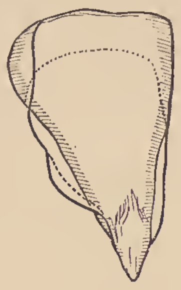


Fig. 19.

Notwithstanding the usual tabulated habit of the Cedar, which is so universal as to have established that form as its stereotyped character, very great variations take place in it. Loudon mentions that at Pepper Harrow, in Surrey, the seat of Lord Viscount Middleton, there are a great many Cedars, some of which are quite fastigiate in their habit of growth, resembling immense Cypresses, while others have the branches depressed at their insertion in the trunk, and their extremities pendulous like those of the Hemlock Spruce. At Dropmore there are three Cedars growing only a few paces from each other (part of an avenue of Cedars planted by the late Lord Grenville not fifty years ago) which form a remarkable contrast: one of the normal habit, another more like that of the Deodar, and the third of a different and less expansive habit than either.

When full grown, the Cedar assumes a very majestic appearance. Accustomed of late years to talk of *Wellingtonias* 300 and 400 feet in height, we have become rather disposed to underrate what in former times we should have thought gigantic dimensions. But a tree of any kind, 80 or 100 feet in height, is in reality something passing common. The trees we see in our parks and woods are rarely above 60 feet high, and after they reach that height, any additional increment bears no just proportion in its effect upon our mind to its actual increase. The ordinary height of well-grown Cedars is from 50 to 60 feet. Loudon specifies one at Strathfieldsaye as being the tallest which he knew in this country; it was 108 feet in height; another at Claremont was 100 feet high, one at Kenwood 95 feet high, and the two largest at Whitton (115 years old) upwards of 70 feet high, with trunks 14 feet 6 inches in circumference at two feet from the ground. The handsomest which he knew of was a magnificent specimen at Syon House, which he figured, and which still bears the palm. Another splendid example stands in a field near Twickenham. There is an avenue of fine Cedars at Chiswick House, which spread mighty, closely-feathered boughs on all sides down to the ground. These, although of good age, still continue rapidly to increase on every side, the branches encroaching on the surrounding space every year. The oldest trees in Britain were those at Chelsea, and they did not exceed 50 feet in height. The *Gardeners' Chronicle* (September 25, 1880) notices a very large, indeed, gigantic specimen, growing in the gardens of W. Jones Lloyd, Esq., Langleybury, Herts, its huge and massive branches spreading far and wide. "The tree measures, at 4 feet from the ground, 22 feet 4 inches in girth; the spreading branches extend over a space of 105 feet, and its height is 107 feet. The great weight of its branches after heavy rains or snow-storms is such as to have caused each limb to be tied by iron rods to the main stem, to prevent their splitting off, whereby upwards of 1½ ton of iron has been used to secure it, forming quite a network among the branches. Fine specimens of this size, of such clean growth, are not an everyday occurrence."

In the groves on the mountains of Lebanon they attain an enormous girth, the largest tree being 40½ feet in circumference at five feet from the ground, and the rest varying from 18 inches upwards; but the height of these patriarchs is not correspondent. Mr. Tristram, in his Travels in Palestine, intitled "The Land of Israel," mentions that their height is no greater than that of the younger trees.

*Geographical Distribution.*—Along with this we have given a Map-Plate, in which we have indicated the districts occupied by the Deodar, the Cedar of Lebanon, and the Cedar of the Atlas. From this, it will be seen that each occupies a distinct territory, 1400 miles away from the other: the first in the western Himmalayas; the second in Lebanon, Mount Taurus, and in the island of Cyprus; and the third in the Mount Atlas Range in the north-east of Africa.

The existence of the Cedar in Cyprus has only recently been made known by Sir Joseph Hooker, who, at the meeting of the Linnean Society, held on the 20th November 1879, exhibited a large branch with male catkins and female cones, which had been sent to him from the mountains of that island by Sir Samuel Baker. Its presence in Cyprus was previously entirely unsuspected. Sir Samuel said that the monks of Trooditissa consider it to be the Chittim wood of Scripture. Sir Joseph, in commenting on the specimen, stated that in general appearance, in the shortness of the leaves and the form of the cones, the specimen resembled the Atlas more than the Lebanon form. The fact of the discovery of this station for the Cedar suggests the possibility of its being found in some other unexplored localities. Plants have been raised at Kew from the seeds sent home by Sir Samuel Baker, and at the present date (Dec. 1881) the seedlings are strong and healthy.

Now, one thing is perfectly clear, and that is, that these three kinds of Cedar must all originally have sprung from one common ancestor. That ancestor may have been the same as one of these, or it may have been something different from either; but the close similarity of all three to each other prohibits the supposition that the difference can have been material. How come these patches to be located at such great distances from each other? Was there once a continuous forest of Cedars all the way from the Himmalayas to Mount Atlas? or, at least, was their range thus extensive, though not absolutely a continuous forest? or did they spread from one common centre, dropping a link here, and cut off by an alteration of level there, so that we have not the remnants of three different quarters of one extensive camp, but three camps left on two or more extensive journeys?

Fossil Remains.

The first and most important point to be ascertained is the date of the appearance of the Cedar in geological time. Was it in existence previous to the Glacial epoch? or was it a form which owed its existence to the change of condition brought about by that epoch? Was it a Miocene, or a Post-Pliocene species? One great difficulty, which we must lay our account with in this inquiry, is the small chance there is of Cedar cones ever having been preserved in a fossil state. As already said, the Cedar partakes of the nature of the Silver Firs, the cone seldom falling entire from the tree. The scales as a rule, and sooner or later, drop off individually, leaving the core of the cone standing erect like a branchlet (which homologically it is)—consequently scales, leaves, and branches may be found; but a mature cone could rarely come within the scope of fossil influence, except under exceptional circumstances. A Cedar cone would indeed not be quite so hopeless a case as that of a Silver Fir, in which there are only a few weeks between the ripening of the cone and its tumbling all to pieces; for the Cedar cone remains on the branches for two or more years. Botanical collectors often find themselves baffled in collecting seeds of the Silver Firs by this quality of their cones. If a week too late, the blows of their axe in cutting down a tree to get the cones scatter them all to the winds. It is thus scarcely possible to conceive of any means by which a ripe cone of a true Silver Fir can ever have been preserved in any fossil deposit. The only time at which it could have been done is in the short interval between greenness and ripeness, whilst it was still sufficiently green to hold together, and sufficiently dry and mature not to rot away.

A tree, growing on the bank of a river, at that stage might, by the falling in of the bank, be engulfed; and in that case it is not impossible, although exceedingly improbable, that a Silver Fir cone might be fossilised. As might be expected from all this, whilst fossil remains of cones of Pines and Spruces are by no means rare, there are only two or three instances recorded of a fossil cone of a Silver Fir or Cedar having been even supposed to be met with.*

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* Schimper in his "Traité de Palæontologie Vegetale," tom. ii. p. 299, mentions the following fossil Cedars: (1) *Cedrus Leckenbyi*, Carruthers, lower greensand, Shanklin, Isle of Wight; (2) *C. Benstedi;* and (3) *C. Corneti*, Coemans, cretaceous rocks of Hainault, Belgium. He describes *C. Leckenbyi* and *Corneti* as resembling the *C. Deodara* rather than *C. Libani.* Schimper expresses his opinion that the Palæcedrus of Unger has nothing in common with *Cedrus.*

Two of these have been referred to the Cedar type. We entertain great doubt of either truly belonging to it; but as we are happily able to do so, we shall place figures of them before the reader, so as to enable him to judge for himself.

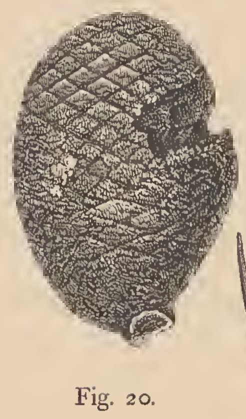
Fig. 20.

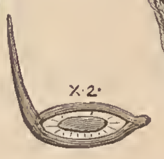

Fig. 22.

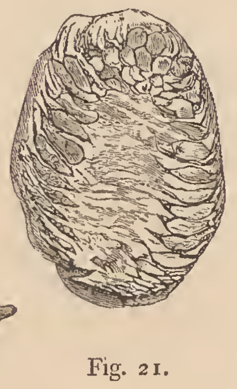
Fig. 21.

The first of the cones in question, figs. 20, 21, 22 (we take that from the oldest geological formation first), is one which was found by the well-known deceased geologist, Mr. Mantell, in the lower greensand, at Maidstone in Kent. Fig. 20 shews the external surface of the cone: the hole at the base is occasioned by the breaking off of the stalk; fig. 21 is a longitudinal section shewing the seeds embedded in the bases of the scales; and fig. 22 is an enlarged view of section of scale containing seed. Mantell figured and described it under the name *Abies Benstedi*,* considering it a form of Fir cone. It is now in the Natural History Museum at South Kensington; and Mr. Carruthers has drawn attention to it as more nearly approaching the *Cedrus Atlantica* in character (*Geological Magazine*, vol. iii. p. 541, December 1866): "The position and shape of the seeds, the form of the scales, the shape of the exposed apices, and the general aspect of the cone are very like those of a Cedar. It may be compared with *Pinus* (*Cedrus*) *Atlantica* Endl." We believe that the grounds on which Mr. Carruthers here specified *Cedrus Atlantica* rather than *Cedrus Libani*, were that the fossil cone more nearly approached the size of the cones of *C. Atlantica* than those of the other Cedars; for the cones of *C. Atlantica* are, as a rule, considerably smaller in size than either those of *C. Libani* or *C. Deodara*. But the fossil is still much smaller than any Cedar cone, although the size of the seeds shews that it is full-grown. It leaves the impression, too, of having been of a more flexible and softer texture. Still there is considerable resemblance; the horizontally placed seeds and the abrupt bend up of the outer half of the scales (fig. 22) is quite Cedrine, and so is the appearance of the exterior at the apex. To assist the reader in comparing the two, we have added outline figures of sections of the cones of the different allied types with which it might be confounded, as the Cedar of Lebanon (fig. 23), Silver Fir (fig. 24), Spruce (fig. 25), and Cluster Pine (fig. 26).

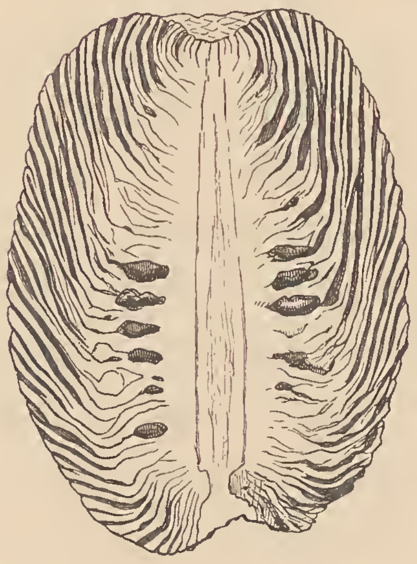
Fig. 23.

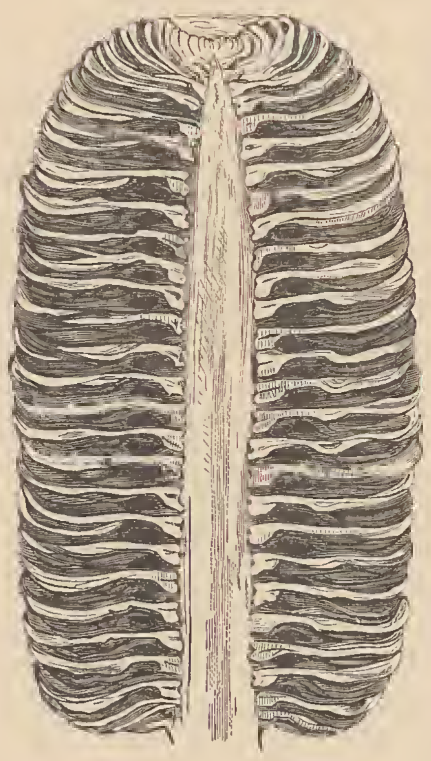
Fig. 24.

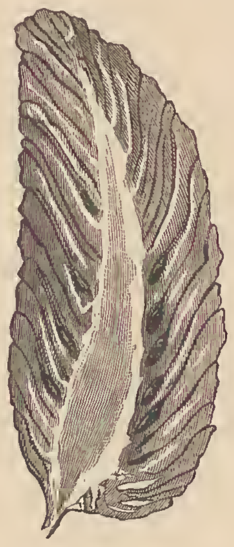
Fig. 25.

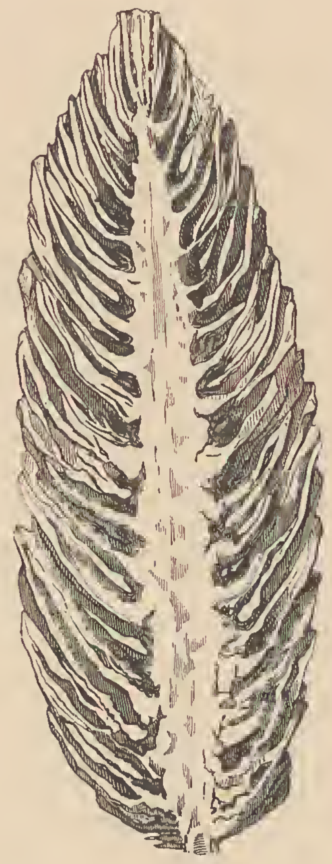
Fig. 26.

The truth seems to be that it may belong to some other Coniferous type which has not come down to us, out of which possibly the Cedar may have been developed; but we do not imagine that *Abies Benstedi* was really a Cedar.

The second specimen was found in the brown coal of Radoboj in Croatia (which belongs to the

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* Mantell in *Quarterly Journal Geological Society*, vol. ii. p. 52, pl. ii., and referred to afterwards by Göeppert in his work on Fossil Coniferæ, p. 217.

Lower Miocene), and was first described by Unger; but his description is extremely meagre, and without any figure. Göeppert, however, in his monograph of Fossil Conifers, says, after reproducing Unger's short description, that he remembers to have seen, in Schlotheim's collection (now incorporated in the Berlin Museum), a specimen of a damaged cone, whose whole form was remarkably suggestive of the Lebanon or the Deodar Cedar.*

We made inquiry concerning this specimen through the late Professor Karl Koch of Berlin; and after some trouble, occasioned by Schlotheim's collection having been merged in the general collection, the cone has been traced, and figs. 27 and 28 are portraits of it from different sides. Its claim to be the cone of the leaves described by Unger seems doubtful. Professor Göeppert has again seen it since we inquired after it, and continues of the mind that it is of the Cedar type. Professor Karl Koch was more inclined to regard it as a Spruce; and we sway in doubt between these two great authorities. If it is a Cedar, it seems nearer our present Cedar than *Abies Benstedi* was. Whether it be a Cedar cone or not, there can be less doubt about Cedar leaves, or something like them, having been found in the brown coal of Radoboj. They are more easily recognised, and their typical character is less easily destroyed. The brown coal at Radoboj in which these traces of the ancient Cedar have been found, lies near Angram, in Croatia, not far from the borders of Styria, and is covered, according to Van Buch, by beds containing the marine shells of the Vienna basin; or, in other words, as stated by Sir Charles Lyell, by Upper Miocene or Falunian strata. The coal thus belongs to the Lower Miocene.

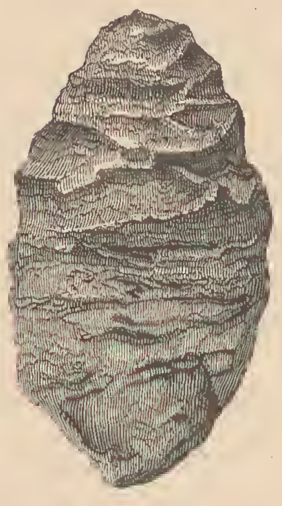

Fig. 27.

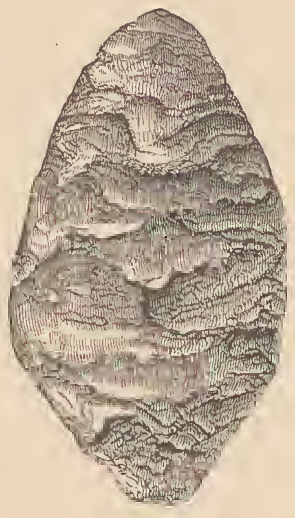

Fig. 28.

We have, therefore, the possible fact, that long before the Glacial epoch there existed in the south of Europe a Cedar in company with forms of animal and vegetable life, which, like the Cedar itself, are now represented by allied species in India.

When the Glacial epoch came, it would be driven south before the cold; and as there was little of Europe above water, or not reached by the Glacial ice at that time, except a part of Spain, North Africa (all Africa north of the Sahara being then part of Europe), Sicily, and perhaps a portion of what is now the Mediterranean Sea, it would be driven into the more southern of these parts.

It is not impertinent to this argument here to cite this fact that the *Pinus halepensis*, which is found at Lebanon, a little below the Cedars, is also found in Mount Taurus and Mount Amanus, and generally in the mountains both in Syria and Asia Minor, and is also found keeping company with them on Mount Atlas. Many other plants, common to both places, could be cited, but the *Pinus halepensis* is more in its own degree, and, besides, has very much the same range, although somewhat more extended.

If they were driven into north Africa, the only part there above water was north-east Africa, where the *Cedrus Atlantica* now lives; and if on the recess of the Glacial epoch, the return of the Cedar into Europe was cut off by the formation of the Mediterranean, that would so far account for its absence in Europe. To the east, again, the Cedar would be driven into those parts of the south which were above water; and if the Cedar districts may be held to point out where the dry land to the south existed, we should then have something of the nature of a sign-post to shew us the places of refuge or gateways of escape from the cold of the Glacial epoch—most of both of Europe and Asia being then either under water or under ice.

The degrees of resemblance and difference between the trees from the different districts seems to lend support to the hypothesis of change of form being produced by the passage of the species into new conditions of existence, and the further corollary that difference in character is equivalent to difference in condition. If we suppose the same tree to have originally spread more or less continuously from Mount Atlas to the Himmalayas, while the climate of all that tract of land was uniform, it is consistent with other facts to infer that it must at that time have been everywhere the same variety; but while such an inference may be drawn, it is modified by the fact that, even when the species is growing under identical conditions, seedling varieties occur, some of which survive and spread.

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* The following is Unger's description of this species:—"PINITIS UNGERI (Palæocedrus extinctus, Unger Synops, p. 200). . . . P. foliis e gemmis subglobosis vel subcylindricis erumpentibus sessilibus rigidis subclavatis obtusis carina in utraque? pagina prominente, tetragonis. Strata tertiaria ad Radobogum Croatiæ."—(*Unger Genera et Species Plantarum Fossilium*, 1850).

Göeppert's description is as follows:—"PALÆOCEDRUS Unger. Folia fasciculata, acerosa, tandem solitaria, pulvinis linearibus haud incrassatis, ramo adnatis cicatricibus rhombeis. Fl. masculi vel amenta stamenigera in apicibus ramorum. Strobili squamis apice haud incrassatis."

The advance, duration, and retreat of the Glacial epoch was accompanied by great geological changes; but we can easily suppose that the very universality and uniformity of the resulting conditions must have produced a uniform climate, not only in the lands immediately subject to the direct influence of much cold, but also in those in their vicinity indirectly exposed only to loss of heat in a minor degree; consequently, any change which such alteration of climate may have produced on the Cedar being universal, would affect the whole, and still preserve the species as one, although perhaps a different one from the Miocene type. Extremes of heat or cold are equally unfavourable to the occurrence of variety of conditions: it is the vacillation between heat and cold which produces change of condition. After the retreat of the cold, variety of condition and climate would more naturally occur than during its continuance; and it is to the change consequent on the different nature of the localities in which the Cedars found themselves after its retreat, that we think that the alteration of the Cedar of Lebanon into the Deodar, or *vice versa*, must have taken place. It was not until the recess of the Glacial epoch that we imagine this change took place. Until the present geological features of the different stations of the Cedar had been developed, the present climatal conditions of each did not exist. Now, if change in form really arises from a change taking place in condition, it should follow that, where the species is under identical conditions, no alteration in form should be observable, with the reservations already set forth, while, where the conditions are different, the form should differ too, and that the greater the difference in condition, the greater should be the difference in appearance.

In accordance with our theory of the change of form being caused by transition from one condition of life to a different one, we should expect what is actually the case—viz., that those Cedars which subsist under the most nearly identical condition should be most nearly alike; while that which dwells under the most unlike conditions should be most distinct; and, at the same time, as the conditions of life of all are still very similar, that no great difference should exist between any. A remark by Prof. Alphonse de Candolle, on the disposition shewn by the Cedar to naturalise itself at Geneva, may be fairly quoted in support of this view.

> "Some trees seem to have a disposition to naturalise themselves, in the true sense of the word. The Cedar (*Cedrus Libani*) is in this case. I see it springing up from seeds at Geneva, in the meadows bordering old trees of its species; and it appears to me that it would succeed, were it not that the scythes of the workmen generally destroy it. Other Conifers often cultivated are in the same predicament. One cannot, however, accept as of any value the assertion of authors, who call a tree naturalised when it has been planted or sown in quantity, and grows well in a park, or in forests made by man. A species might, in this case, give good seed without naturalising itself, as the wheat, the Indian corn, the potato, and so many other plants do which are cultivated on a general scale, and which do not establish themselves in Europe, notwithstanding the abundance and perfect quality of their seeding." (*Geogr. Botanique Raisonée*, ii. p. 741.)

But the self-sowing of the Cedar at Geneva he does not put in this category; and, according to our view, seeing the similarity between the climate, both of the Taurus, Lebanon, and Mount Atlas, and that of Central Europe, there seems no reason why the tree should not establish itself in the latter, if a fair opportunity were given it to do so.

The foregoing is our notion of the way in which the distribution of the Cedars has been brought about; but we must not forget that there are other hypotheses, whereby the geographical sundering of the three kinds of Cedars has been attempted to be accounted for. We need, however, to draw attention only to that of Sir Joseph Hooker, which has been already cited in our description of the Deodar, to which the reader is referred. Leaving him otherwise to form his own conclusions as to the causes of the present distribution of the Cedars, we shall now turn to the history of the trees of Lebanon, since the time that man has first left record of them, and endeavour to ascertain how far they occupy their old ground, and, where we find them on the decrease, to inquire as to what cause that is to be attributed.

Present Range of the Cedar.

The Cedar of Lebanon is found at various places in the mountain range of that name, and also in vast forests in the Boulgar dagh chain of the Taurus in Asia Minor, and thence westwards along the Taurus range to east long. 36°; eastwards to Pisidia in east long. 32°; and northwards to the Anti-Taurus range in north lat. 38°: in all these growing at an altitude of from 4000 to 6333 feet above the sea. All these localities are parts of the same range of mountains, or offshoots from it. Pierre Belon, a French botanist from Mans (designated in the learned affectation of his time as *Bellonius* or *Bellonius Cenomanus*), is the first author on whose knowledge we can depend, who announced the occurrence of the Cedar beyond the limits of Mount Lebanon. He travelled in the Levant from 1547 to 1550; and, what gives him an especial interest in our eyes, he wrote a very fair scientific treatise on Conifers. He reported that he had seen forests of Cedar in Asia Minor, upon Mount Taurus, and Mount Aman.

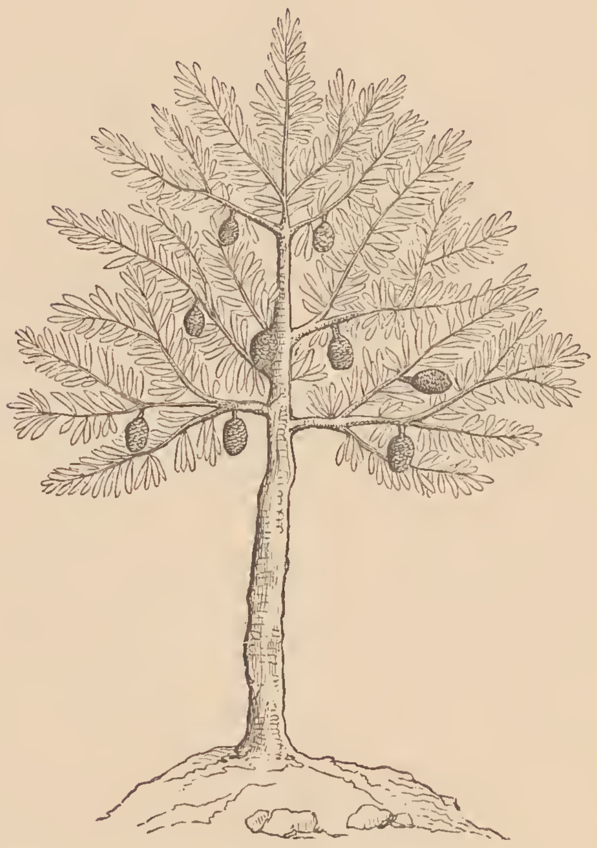

Fig. 28.

> "We found on Mount Amanus as lofty Cedars as on Mount Lebanon. . . . . . We found on Mount Taurus lofty Cedars the same as those on Mount Lebanon, of which some of our company at my suggestion furnished themselves with the apples, which are somewhat like the apples of the Fir, but larger and smooth, and facing the sky [erect]. Now, not wishing to waste time in describing this tree, we have preferred to give a portrait of it (fig. 28) to shew it [in which, however, the cones are pendulous]. There is such a great quantity of Cedars on the slopes of Mount Taurus, that we see no other trees so common." ("Les Observations de Plusieurs Singularites, &c., trouvees en Grecé, en Asié, &c.," par Pierre Belon, p. 360 and 370, 1588.)

Belon also says that he was told it was found on the mountains above Nicea.

La Roque, in 1722 ("Voyage de Syrie et du Mont Libani," i., p. 86), says that it is reported that in former times it was abundant in Cyprus, but that in two voyages which he had made to that island, he had never met with any one who pretended to have met with them there. It might have been the Cypress which formerly abounded. At all events, it was not until more than a century and a half after La Roque wrote that we find any notice of the Cedar of Lebanon existing in Cyprus. Its presence there, which was certainly unsuspected, was made known to the Linnean Society in 1879, as already stated at page 6.

Pierre de Tchihatcheff, a Russian naturalist, who explored Asia Minor, thus describes the forests on Mount Taurus:—

> "In following the southern slopes of the Boulgardagh, I was struck by the fine forests of Cedars which mount even to the upper regions of this majestic rampart. I had at first supposed that it was only a local, although very interesting phenomenon; but, on ascending the Zamantau-Sau, from Saihoun, where it debouches, I had the happiness to traverse for several successive days, the finest forests of Cedar which are perhaps known at the present day, so that the band which, on my botanical map of Asia Minor, marks the domain of the Cedar, may extend from 140 to 160 miles from the south-west to the north-east. Until now, botanists have been wont to make pious pilgrimages to the celebrated Cedars of Mount Lebanon, and I myself had also been led fifteen years ago to contemplate with profound emotion the ten or twelve centenarian trunks which raised themselves in isolation on that classic ground; but now they appear to me very trifling before the fine forests which I have just traversed, and alongside of which they figure only like our hothouse Palm-trees when compared to the Palm-trees of the forests of the tropics." (*Ann. des l'Acad. de Sciences*, vol. xviii., p. 759.)

In his "Asie Mineure," M. de Tchihatcheff specifies, in more detail, the exact localities where he met with the Cedar in the Taurus and Anti-Taurus range. These were: (1.) in Trachean Cilicia, on the Topgedik dagh, or mountain, at an elevation of 6000 feet above the sea; (2.) on the southern slope of the Boulgar dagh, at almost 9000 feet height; (3.) in the Anti-Taurus, between Sarkantyoglon and Tchedémé, associated with the *Abies Cilicica* and *Juniperus excelsa*, at an altitude of 4100 feet; (4.) between Feke and Hadjin; and (5.) between that last town and Gueksin, at 3600 feet. Gueksin (which lies at the eastern foot of the Anti-Taurus range) is the most eastern point where he observed the Cedar in Cataowa, and he says that he is ignorant whether it passes from thence into Armenia, "which it may perhaps be permitted to doubt." (Tchihatcheff, "Asie Mineure," 2d part, p. 308, 1856.)

These localities are shewn in the sketch in our second Map-Plate relating to the geographical distribution of Cedars. In regard to the altitude at which it is found, he states that, "on the mountains which surround the Cilician Pyles, he had seen the Cedar form the upper limit of arborescent vegetation, and stop at about 6333 feet, while upon several points of the southern slope of that chain it reaches the altitude of 9000 feet." (Id., 2d part, p. 300.)

M. Kotchy's Explorations in Cilicia ("Reise in Cilischen Taurus," 1858) have extended our knowledge of its range in Asia Minor, and confirmed the localities specified by M. de Tchihatcheff; and from the two we have compiled the Map of its distribution on Mount Taurus, and its branches given in our Map-Plate.

In consequence of the occurrence of the *Cedrus Atlantica* on Mount Atlas, which until Manetti's time was never doubted to be the same as the Cedar of Lebanon, Loudon imagined it to be probable that the range of the Cedar extended "not only over the whole of that group of mountains, which is situated between Damascus and Tripoli in Syria, and which includes the Libanus and Mount Amanus and Taurus of antiquity, and various other mountains, but that its distribution on the mountainous regions on the north of Africa is extensive, though of the botany of these latter regions scarcely anything is at present known." So far as this seeks to supply a link or extension of the range between Lebanon and Mount Atlas, the idea is without foundation. So far as it anticipates an extended range to the north and south of Mount Lebanon, and between it and Mount Taurus, it is probably well founded.

Pallas, Baudrillant, Delamarre, and other old authors, specify the Cedar as found in Siberia, in the countries between the Wolga and the Tobol, and on the Altai Mountains. This was shewn by M. Ferry (in a paper in the "Bibliothèque Physico-Economique") and by M. Loiseleur to be an error, originating in the misapplication of the Russian word *Kedr*—which is the name for the *Pinus Cembra*—which was certainly the tree referred to by Pallas and the authors above mentioned. The same error has been repeated by eminent men in our own times. Sir Roderick Murchison, in his Presidential Address to the Royal Geographical Society, 1864, p. 41, says: "These regions are Siberia proper, to the southern limit of which the reindeer ranges, and in which the Siberian Cedar grows." More recently Mr. Henry Lansdell, in his interesting work "Through Siberia," 1882 (vol. i. 149, and ii. 190 and 260), mentions the Cedar as growing north of the Altai chain, also on the Lower Primorsk, and in the valley watered by the Kamchatka.

There is no such thing as a Siberian Cedar; and we only allude to it for the purpose of preventing any one accepting the statement on the faith of Sir Roderick's well-known accuracy. He subsequently informed us that it was a *calami lapsus*, and that the tree he was speaking of was the *Cembra*, a tree which he had had ample opportunity of studying in all its forms; and this is evidently the tree which Mr. Lansdell has mistaken for the Cedar.

The best known habitats, however, although apparently much smaller in extent than those above mentioned, are those which occur on the mountains of Lebanon, lying between north lat. 33° 30′ and 34° 15′, and in east long. 35° 35′ and 36° 5′. So far as we yet know, their present range in that district is, with one exception, confined to the western slope of these mountains, parallel to the coast, a little to the north of Beyrout, and about 15 miles inland from the sea, running south with a large break in the middle, as far as the latitude of Sidon and Damascus. The trees were, within until a very recent period, generally supposed to be confined to a single grove at the head of the Kedisha valley; but ten or twelve other habitats are now known, five or six of which are at no great distance from this best known and probably oldest grove. But although this was the general belief, it was well enough known to those who studied the subject, that more than one grove did exist.

Seetzen, who travelled through that country in 1805, mentioned three localities in periodicals at the time. In an account of his travels, which was published in 1854 (Seetzen, "Reisen durch Syrien," &c., i., pp. 167, 179, and 213), one of these localities was stated to be near El Hadith, south-west of

Ehden, and another in the district Ed-Dunniyeh, south of Akkar; but he visited neither of them personally. He, however, was at Etnub, north of Ehden, where the region is wooded, and there he found Cedars to the number of several thousands.

In respect to the grove near El Hadith (which the natives and others speak of as *Arz*, Cedar), Dr. Robinson, in his "Biblical Researches," says that he was informed by Dr. Paulding of Damascus, that although the trees bear a general resemblance to the Cedar, yet their leaves were altogether different, and mark them as a different kind of tree. But Mr. Tristram thinks that Dr. Paulding must have been either mistaken in his botany or in his topography.

Hemprich and Ehrenberg next added to the number of known habitats. These eminent naturalists spent a considerable time on Lebanon, and found Cedars between Tripoli and Beyrout. They mention this in their Report in 1823, but they do not specify the exact locality. Dr. Robinson, however, states that Ehrenberg told him that he had found the Cedars growing abundantly on those parts of the mountain lying north of the road between Baalbec and Tripoli, and that the trees were of all sizes, old and young, but none so antient and venerable as those usually visited. Sir Joseph Hooker, however, obtained further information from him, which he, in his paper on the Cedars of Lebanon, has noticed. (Hooker, *op. cit.*, 1862, p. 4.) He there mentions that, in answer to his inquiries, Professor Ehrenberg informed him that he had found many Cedars in the forests of Oak, &c., on the route between Bsherreh and Bshinnate. These two places lie about five miles apart, north and south, as the crow flies, and the former is about three miles west of the main grove. The trees noticed by Ehrenberg, therefore, are obviously only stragglers from or part of the main detachment at the head of the valley of the Kedisha.

M. Bové, ex-director of Agriculture of Ibrahim Pacha at Cairo, met with a new habitat on the route from Baalbec to Beyrout. He says: "The 11th of October, 1861, I set out from Sakhlehe, conducted by Maromb guides, to go to Der El Khamar. . . . . We crossed a valley in the afternoon, of which the right was enclosed by a mountain, on whose summit grew some thousands of *Pinus Cedrus* covered with flowers. These trees are from one to four yards in circumference, and their height exceeds fifteen yards. I think that these Cedars owe their preservation to their position on mountains of difficult access, and distant from towns where their timber would be of use, and to which it could only be transported on the backs of animals." (*Annal. des Sciences Naturelles*, 2d ser., vol. i., p. 235.)

M. Laure, in 1863, remarked: "Above the village of Ehden one sees large trees which the distance does not permit to recognise, but the natives affirm them to be Cedars." (Laure in "Cultivateur Provençal," p. 317.)

Sir Joseph Hooker visited the Cedar Grove himself, along with Captain (afterwards Admiral) Washington and Captain Maunsell, in 1860, and the paper by Sir Joseph Hooker, above referred to, gives an account of their observations. They did not, however, meet with any additional groves; but the Rev. R. B. Tristram, who with a party of naturalists made an extended tour in Palestine in 1863, having more time, was more successful. He seems to have re-discovered one (he thinks two) of the groves mentioned by Seetzen in 1805, and at any rate, found four localities in all, including the chief grove, and one of these at least, and perhaps the largest, was previously unknown. The first additional habitat which he discovered was the following:—

> "Just above the fountain of Ehden, towards Bsherreh, stands another clump of antient Cedars, which, though fine old trees, have from their comparatively smaller size been neither noticed nor recorded by travellers. They are probably a relic of the antient forests which may have extended along the edge of the valley." (Tristram's "Land of Israel," p. 626.)

The second discovery is thus described:—

> "We sent on our mules direct to Akurah, but determined to make a slight detour ourselves, in order to visit a district marked by Van de Valde as not examined. We had hardly left Hazrûn, when we had to turn our backs on the romantic Kadisha, and climb the bare shoulder of Lebanon which projects to the south-west, in order to reach El Hadith. As we were riding up the steep, we met two men carrying firewood, and Lowndes' quick eye at once detected some boughs of Cedar. We eagerly inquired where they found *Arz*. They pointed to some scattered trees on a bare hill-side, between El-Hadith and Niha, which they said were all *Arz*. On examination we found they were quite right. The nearer slopes

were scattered very sparsely with old riven and half-decayed Junipers, and a few aged *Pinus Halepensis*, while the Cedars were all collected on this hill." (Tristram, *op. cit.*, p. 6–8.)

The third and last discovery was made almost immediately afterwards :—

> "An hour afterwards, as we crossed the next ridge, and came to one of the feeders of the Dunzeir, we noticed that the wild gorge to our right was clad from top to bottom with a scattered forest of trees, which, when examined through the glass, appeared too spreading and flat-topped for Pines. In spite of Hammond's angry remonstrance against our wandering we knew not whither, we pushed on for the ravine. It was too elevated, as well as too rugged, to encourage any attempt at cultivation, even by the mountaineers of the Lebanon, and has remained, untouched by man, one of the last refuges of the Syrian bear. The trees were all Cedars, grouped in clusters or scattered in every variety of situation, some clinging to the steep slopes, or gnarled and twisted on the bare hill-tops, others sheltered in the recesses of the dell. Lowndes climbed one of the larger trees, and brought down some cones in triumph. The largest tree might be 15 or 18 feet in circumference, but none that we saw approached the patriarchs of the Grove, either in size or magnificence. Still there was Cedar enough here to have rebuilt Solomon's Temple. We have now discovered it in two mountain valleys, growing in every variety of situation. . . . Nor are the four places I have referred to the only spots where the Cedar of Lebanon still lingers. I have good authority for stating that it is also found abundantly scattered about Duma, a place five hours south-west of Hadith. More interesting still is its existence in a far distant part of the mountain. In one of the glens to the north of Deir El Kamar, the antient stronghold of the Druses up the course of the Nahr El Baruk, south-east of Bhamdun, near the village of Ain Zahalteh, are many scattered trees and small clumps. Probably a careful search among the western roots of the Lebanon would result in the discovery of many more relics of the primeval forest." (Tristram, *op. cit.*, p. 629.)

Mr. Tristram modestly disclaims any priority of discovery in regard to these new habitats; but, as it appears to us, in doing so he neither does justice to himself nor his companions. One of the new localities certainly belongs entirely to his party; and we do not see that he has any grounds for holding, as he does, that both of the other new groves were those which had been recorded by Seetzen. The first may have been, but we see no indications that either of the others was. Mr. Tristram's own conclusion regarding the distribution of Cedars in that district, as stated in the first edition of his "Land of Israel," was that they might yet be found in far greater abundance than he has ventured to suggest.

His anticipation in this respect has been already amply verified. Before leaving Syria, he interested the American Missionaries at Beyrout in the subject, and pointed out to them the probable localities. We learn from a note to the second edition of his work (page 634) that his friends had made several excursions in the interior, and one of them, Mr. Jessop, had found five additional localities, three of great extent east of Ain Zahalteh, in the southern Lebanon, and situate far to the south, with a wide break between them and "the Grove." He found that this new habitat recently contained some 10,000 trees, but unfortunately the Sheik of the district had got a concession of the forest from the local authorities, for the purpose of extracting pitch, and destroyed several thousand trees in the attempt, which proving, as might have been anticipated, unsuccessful, retributive justice fell upon him, and he was utterly ruined by the speculation, although not until he had perpetrated his vandalism very effectually.* Mr. Jessop found that one of the stumps in this forest (it cannot be called a grove) measured 13 feet in diameter, that is 39 feet in circumference, a size not greatly short of that of the largest tree in "*the* Grove," which was 40½ feet in circumference 5 feet from the ground. The stump in question would probably be nearer the ground. This forest is full of young Cedar trees, springing up with great vigour.

There are two other large groves containing many thousand trees, one above El Baruk and another near Maásir. He reports these trees as very large, and equal to any others. They are being sadly destroyed for firewood near Duma. Mr. Jessop also discovered a second grove, near where Mr. Tristram discovered a grove, or rather glen of Cedar, on the western slopes of Lebanon. What is perhaps of still greater interest, two small groves have been found on the *eastern* slope of Lebanon, overlooking the Bukaá above El Medenk. This is the first indication that the Cedars may have covered both sides of Lebanon in former times, as we see that they do both sides of Anti-Taurus in the same line. We have thus now thirteen distinct ascertained localities in the Lebanon, and the northern mountains have not been explored at all. The localities are as follows:—

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* In the *Gardener's Chronicle* of September 24, 1881, will be found an extract from the Vienna *Politische Correspondenz*, from which we learn the gratifying fact that steps have recently been taken by the Governor-General of the Lebanon for the preservation of what now remains of these venerable trees. The article proceeds: "The once famous Cedar forest of Lebanon, formerly so extensive, has dwindled down to the dimensions of a mere thicket, numbering about 400 trees. To save it from complete destruction, and preserve it at least in its present extent, Rustem Pacha, the Governor-General of the Lebanon, has issued a special ordinance, containing a series of stringent regulations calculated to check, if not quite to put a stop to, the vandalism and carelessness of most travellers. It is expressly forbidden to put up tents, or other kinds of shelter, within the district of the trees, or to light fires, or to cook any provisions in their vicinity. No one is allowed to break off a bough or even a twig from the trees. It is forbidden to bring any beasts of burthen, be they horses, mules, asses, or any other kind of animal, within the district. Should oxen, sheep, goat, or other pasturage cattle, be found within the prescribed limits, they will be irredeemably confiscated."

1. The "Grove."
2. The grove at Etnub, found by Seetzen.
3. The clump near Ehden, found by Tristram, and probably that referred to by Lithgow in 1614.
4. Between El Hadith and Kunât, found both by Seetzen and Tristram, and probably that referred to by Eugene Roger in 1636.
5. At Ed Dunniyeh, south of Akkar, found by Seetzen.
6. The forests on the road between Bsherreh and Bshinnate, found by Ehrenberg.
7. In the Dunzier gorge.
8. Duma.
9. East of Ain Zahalteh (very large).
10. Two small groves above El Medenk, on the eastern slope, overlooking the Bukaá, long. 35° 45′ E., and lat. 35° 47′ N.
11. Above El Baruk.
12. Above Maásir.
13. Between Sakhlehe and Der El Khamer, discovered by M. Bové.

It is not difficult to understand how these localities have remained unknown until now, while the principal grove has been so celebrated. It alone lies adjacent to any of the great roads which lead across Lebanon; and there was nothing to tempt, but much to deter, travellers from diverging from the route, and wandering without an object into the unknown and more inaccessible parts of the mountain.

The "Grove" lies in the Kedisha valley, at an elevation of 6000 feet above the sea (which, it will be remembered, is the same elevation as that of the range of the Cedar on the southern slope of Mount Taurus). The valley extends 2 or 3 miles in length, and as much in breadth. As described by Sir Joseph Hooker, it terminates in open broad shallow flat-floored basins, with shelving sides, which rise from 2000 to 4000 feet above their bases, resembling the corries of our Highland mountains. The floor of that in which the Cedars grow presents almost a dead level to the eye, crossed abruptly and transversely by a confused range of antient moraines, which have been deposited by glaciers that, under different conditions of climate, once filled the basin above them, and communicated with the perpetual snow with which the whole summit of Lebanon must at that time have been deeply covered. The moraines are perhaps 80 to 100 feet high; their boundaries are perfectly defined, and they divide the floor of the basin into an upper and lower flat area. The rills from the surrounding heights collect on the upper flat, and form one stream, which winds amongst the moraines on its way to the lower flat, whence it is precipitated into the gorge of the Kedisha. The Cedars grow on that portion of the moraine which immediately borders this stream, and nowhere else; they form one group about 400 yards in diameter, with an outstanding tree or two not far from the rest, and appear as a black speck in the great area of the corry and its moraines, which contain no other arboreous vegetation, nor any shrubs, but a few small barberry and rose bushes that form no feature in the landscape.

*History.*—The earliest notices which we have of the Cedar are in the Bible, and the first genuine allusion to it occurs in the reign of David, it being almost certain that one or two previous notices of a tree bearing that name do not apply to it. We shall, however, quote the principal.

The oldest book in the Bible is said to be Job; and if Hebraists are right, it was written before the Israelites occupied the whole of Palestine, or probably knew about Lebanon; consequently the presumption is against any allusion to the real Cedar occurring in that book; and, unless it should be indisputably appropriate, we must refer any supposed allusion to the Cedar in it to some other tree. There is one verse in which the Cedar is spoken of, but the allusion is singularly inappropriate, and therefore most probably

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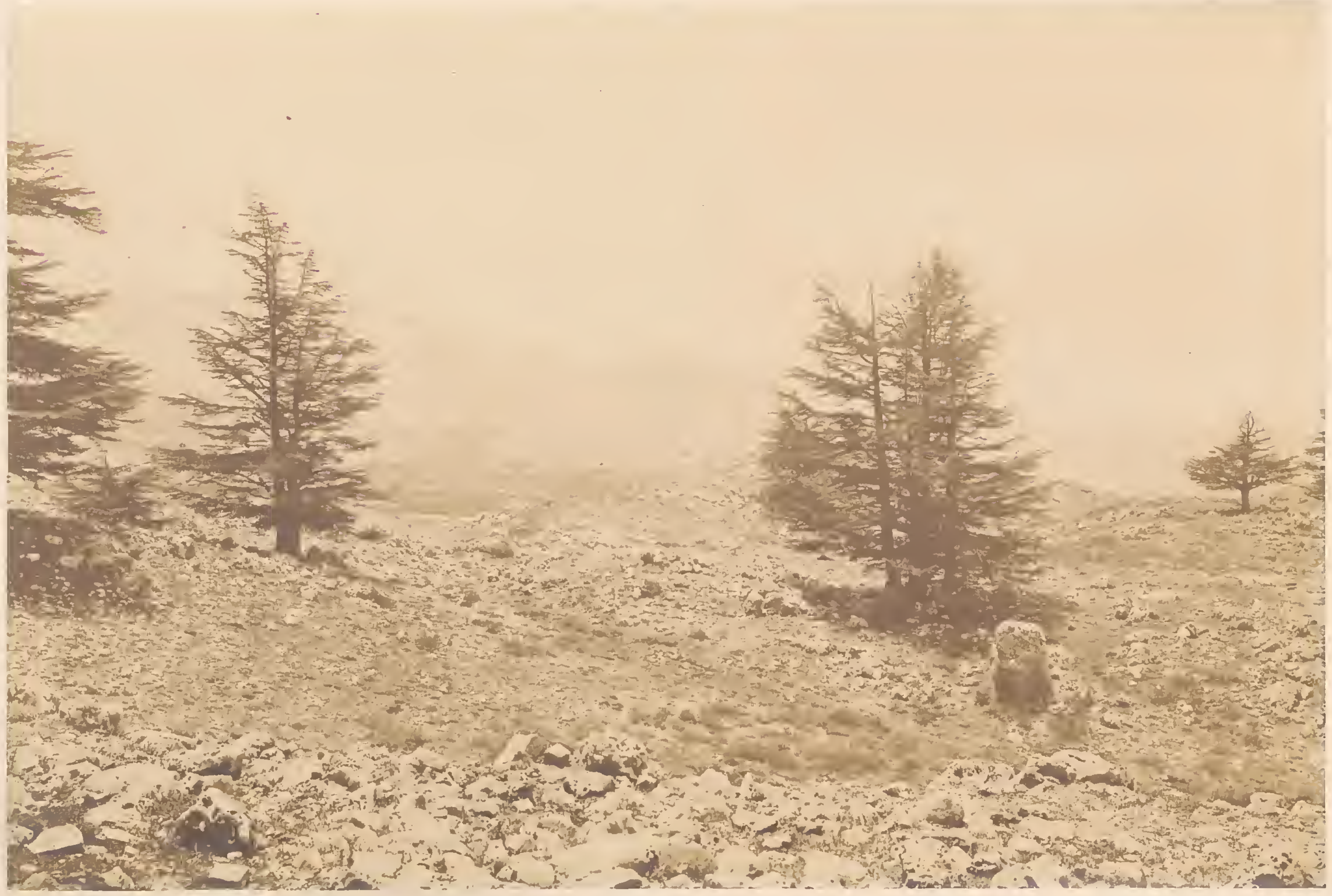

THE APPROACH TO THE CEDARS ON MOUNT LEBANON

View Looking North West from A on Map

Photographed by F. Mason Good, Winchfield, Hants.

probably does not apply to it. It is in the description of the Behemoth (chap. xl. 17), "He moveth his tail like a Cedar." This obviously is meant to convey the idea of a strong, supple, and elastic whip-like tree, such as the Poplar or the Cypress. It has no point of resemblance with the Cedar, and seems to suit the Cypress better than any other tree of the East.

The next places where the word occurs are in Leviticus (xiv. verses 4, 6, 49, 51, and 52), in relation to the cleansing of lepers, and it seems pretty clear that neither can they really apply to the Cedar of Lebanon.

The same objections equally apply to the next notice of the Cedar. It occurs in Numbers (xix. 6).

Neither is the next notice, which is a poetical allusion in Balaam's prophecy of the blessing of Israel, wholly free from doubt. It is in Numbers (xxiv. 6).

There may be no reason to dispute that the allusion to the Cedar in Judges (ix. 15), in the speech of Jotham on the election of Abimelech as king, really relates to the Cedars of Lebanon. "And the bramble said unto the trees, If in truth ye anoint me king over you, then come and put your trust in my shadow; and if not, let fire come out of the bramble and devour the Cedars of Lebanon."

It is not, however, until David was seated on the throne of Israel that the haze of antiquity begins to clear off, and we come to real practical commerce in the Cedar as a branch of trade. The Jews had by that time firmly established themselves over the whole of their kingdom, and their territories adjoined those of the kings of Tyre and Sidon.

In 2 Samuel v. 11, we read, "And Hiram, king of Tyre, sent messengers to David, and Cedar trees, and carpenters and masons; and they built David an house."

It was natural for so devout a mind as David's, after he had found and appreciated the excellencies of Cedar timber in his own house, to wish to extend the use of it to the Lord's house; and the next mention of it in the Bible is an intention or proposition to that effect by David (2 Samuel vii. 2, and in nearly the same words in 1 Chron. xvii. 1). The idea was, however, abandoned by David, and he contents himself with making preparation for the execution of it by Solomon when he should succeed him (1 Chron. xxii. 4).

After the death of David, and when Solomon was seated on his throne, frequent mention of the Cedar occurs. The first notice is in 1 Kings (iv. 33). Immediately after we have the account of the resumption of David's dropped scheme for building a magnificent house or temple to the Lord; and as the excellence of the Cedar of Lebanon was the first thing which suggested to David the idea of building a temple to the Lord, so we find the same idea, of its special fitness for the purpose, also taken up by Solomon. Although, afterwards, as the temple rises, and his means increase, his ideas become more magnificent, and gold, silver, and precious stones are lavished in its decoration, the Cedar of Lebanon was, at the outset, the chief element of grandeur contemplated by Solomon. The first thing he does is to send to Hiram, who possessed the desired material, telling his project, and asking his help (2 Chron. ii. 3 and 8, and 1 Kings v. 6).

To Solomon's application Hiram replied (1 Kings v. 8 and 10), saying, "I have considered the things which thou sentest to me for: and I will do all thy desire concerning timber of Cedar, and concerning timber of Fir" [clearly *Pinus Halepensis*, which grows plentifully along the base of Lebanon]. "So Hiram gave Solomon Cedar trees, and Fir trees, according to all his desire." And that it was no trifling amount that was taken out of the forests may be gathered from what follows; indeed it seems almost certain that the devastation of the forests was greatly accelerated by the enormous demands made upon them by Solomon (1 Kings vii. 2, *et seq.*)

The next passages in which mention is made of the Cedar give a glimpse of the extent of the uses to which it was put (1 Kings vi. 9, *et seq.*): "So he built the house, and finished it; and covered the house with beams and boards of Cedar. And then he built chambers against all the house five cubits high; and they rested on the house with timber of Cedar. . . . . And he built the walls of the house within with boards of Cedar, both the floor of the house, and the walls of the ceiling: and he covered them on the inside with wood, and covered the floor of the house with planks of Fir. And he built twenty cubits on the sides of the house, both the floor and the walls with boards of Cedar: he even built them for it within, even for the oracle, even for the most holy place. And the house, that is, the temple before it, was forty cubits long. And the Cedar of the house within was carved with knops and open flowers: all was Cedar; there was no stone seen. And the oracle he prepared in the house within, to set there the ark of the covenant of the Lord. And the oracle in the fore-part was twenty cubits in length, and twenty cubits in breadth, and twenty cubits in the height thereof: and he overlaid it with pure gold; and so covered the altar which was of Cedar. . . . . And he built the inner court with three rows of hewed stone, and a row of Cedar beams."

The house of the Lord was finished in seven years, but Solomon built a great deal more than it of Cedar. He built a house for himself. (1 Kings vii. 1) "But Solomon was building his own house thirteen years." Next (ver. 2), "He built also the house of the forest of Lebanon; the length thereof was an hundred cubits, and the breadth thereof fifty cubits, and the height thereof thirty cubits upon four rows of Cedar pillars with Cedar beams upon the pillars. And it was covered with Cedar above upon the beams, that lay on forty-five pillars, fifteen in a row." It was of this palace that Josephus says that nothing surprised Nicaulis, Queen of Egypt and Æthiopia (the same that is called in Scripture the Queen of Sheba), when she came to Jerusalem to see Solomon, as the beauty and splendour of one of the halls of this palace, which was enriched by 200 massive golden bucklers, each of the weight of 600 shekels.

All this building work extended over a period of upwards of twenty years (1 Kings ix. 10). We have seen that the house of the Lord took seven years, and Solomon's own house, which was not begun until the other was finished, took thirteen years.

But although these edifices were the most magnificent, and those in which doubtless the greatest consumption of Cedar took place, this was still a very small part of the building done by Solomon. In addition to the works above mentioned, Solomon built a wall round Jerusalem, and the city of Millo and Hazor, and Megiddo, and Gezer, and Beth-horon the Nether, and Baalath, and Tadmor in the wilderness, and "all the cities of store that Solomon had, and cities for his chariots, and cities for his horsemen, and that which Solomon desired to build in Jerusalem and in Lebanon, and in all the land of his dominion" (1 Kings ix. 19). He also built a navy in Eziongeber, on the shore of the Red Sea (1 Kings ix. 26).

There must also have been much more building in Jerusalem; for we are told in 1 Kings x. 27 (and in almost the same words in 2 Chron. i. 15, and ix. 27), that "the King made silver to be in Jerusalem as stones, and Cedars made he to be as the Sycamore trees that are in the vale for abundance." The true reading of this passage, we think, is, that by his importations of Cedar he made it so common as to be as plentiful as the Sycamore tree (the ordinary wood of the country). It is not, however, so taken by Josephus. In repeating the account of Solomon's buildings, which is obviously a copy or paraphrase of the Bible account, he says, "And so multiplied Cedar trees in the plains of Judea, which did not grow there before, that they were like the multitude of common Sycamore trees." (Whiston's "Works of Josephus," p. 336.) An interpretation which Loiseleur again carries still further from the simple account given in the Bible: "Josephus says that Solomon, being desirous that his kingdom should be abundantly supplied with wood, caused so many Cedars to be planted in the plains of Judea, where there had been none before, that they became as common as Mulberries." ("Histoire du Cèdre," Ann. Agr. Franc., 1837, p. 365.) It appears plain to us that this is not what is meant in the Bible, and not less so that, if Solomon had tried the experiment of growing the Cedars in the plains of Judea, it would have been a failure. Cedars will not grow there.

Notwithstanding the vast consumption of Cedars during Hiram's reign, it would appear that plenty still remained, for the next allusion to them in the Bible after Solomon's time, is in the threat by Sennacherib, the King of Assyria, in the days of Hezekiah (2 Kings xix. 23, and in almost the same words in Isaiah xxxvii. 24), to cut down the tall Cedar trees of Lebanon. Sennacherib obviously knew that Lebanon was not within the territory of Hezekiah; for, after threatening its destruction, he next goes on to say he would enter into Hezekiah's borders—*i.e.*, his own territory. Still, knowing that Lebanon was the source from which a favourite magnificence of the kings of Judah was drawn, he sought to intimidate him by threatening to annihilate it.

It is with reference to these invasions of the Assyrians that Isaiah prophesies (Isaiah ix. 10), "The bricks are fallen down, but we will build with hewn stones; the Sycamores are cut down, but we will change them into Cedars;" and in Isaiah xiv. 7, 8, "The whole earth is at rest, and is quiet: they break forth into singing. Yea, the Fir-trees rejoice at thee, and the Cedars of Lebanon, saying, Since thou [*i.e.*, the King of Babylon] art laid down, no feller is come up against us." This would indicate that the Assyrians had at some time or other actually carried Sennacherib's threat into execution, and made havoc in the forests of Lebanon. Mr. Layard thinks that he has not only found a passage in the cuneiform inscriptions at Nineveh, in which the builder of the edifice narrates that he had brought Cedars to it from the forests of Lebanon, but also an actual portion of one of the beams itself. We shall have to consider the weight to be attached to Mr. Layard's discovery by and by, when we come to speak of the growth and age of the tree. In the meantime we shall only say that we are sceptical both as to the timber found by him being Cedar from Lebanon, and, generally, as to the dependence to be placed on the attempts to decipher these cuneiform inscriptions; and therefore we do not attach any weight to the confirmation offered by Mr. Layard; but those who are free from such doubts will of course accept it as additional evidence of the cause of the present scarcity in Lebanon of this once plentiful tree.

The last historical reference to the Cedar in the Bible occurs in Ezra, where an account is given of the rebuilding of Jerusalem by Cyrus (Ezra iii. 7).

The remainder of the allusions to the Cedar are poetical; and although they are not only of great beauty, but furnish much matter for interesting speculation and reference, scarcely come within the scope of a botanical work.

It is very generally taken for granted that the Psalms are full of illustrations drawn from the Cedar; and yet, on looking for them, we find only a few brief allusions. A more important point, on which we desire to correct the general belief, is the notion which some persons have that the Cedar of the Lebanon is not the Cedar of the Bible, or that a large proportion of the references to it properly belong to some other tree. But we think there cannot be a better correction for anything that is excessive or erroneous in that idea, nor a better means of discriminating the references to the true Cedar of Lebanon from those to something else also bearing the name of El'Arz, than a complete survey of the whole references placed in one view, and as nearly as possible in chronological order. This we have endeavoured to give, and we do not think any one can rise from the consecutive perusal of these passages without feeling that Hiram's gift of Cedars to David, and every quotation subsequent to the date thereof, all relate to the same tree; and that that tree was our Cedar. Those mentioned previously in Leviticus and Numbers equally plainly refer to something else.

The Cedar is mentioned nowhere in the New Testament.

Passing from the Scriptural allusions, it may not be uninteresting to run over the notices which we have met with of the size and the numbers of the Cedars on Lebanon, given at different periods by various authors. These carry us back for at least three hundred years, and give a tolerably connected view of their history and state during that time.

The most antient author who has spoken of the Cedars of Lebanon, appears to have been the Father Nicole le Huen, a French priest, who made a pilgrimage to Jerusalem in 1487. In his "Grand Voyage de Jerusalem," he speaks of Mount Lebanon as being remarkable for "the very high Cedars and other verdant trees in great multitude and marvellous procerity;" and breaks out into admiration of the amenity and beauty of the mountains of Lebanon, and of their products, which he enumerates, concluding—"Item est mont de liesse et jocundité car sur ces monticules croissent les vins excellens que communèment sont cause de joye inductive à liesse." But he does not say anything about the numbers of the Cedars.*

The next is Martinus à Baumgarten in Braidenbach, a German knight, who passed and saw the snowy peaks of Mount Lebanon, in a pilgrimage through the Holy Land, on 31st January 1508, and speaks of its being full of Cedars, Pines, and other noble trees; but he does not appear to have visited the Grove, nor does he mention the number of the trees.†

There is a blank of above forty years before we have further accounts. Those we next get are from Pierre Belon, or Bellonius, previously mentioned. When he visited the Grove he counted the Cedars, and tells us that they are supposed to amount to twenty-eight in number, although it is difficult to count them, they being a few paces distant from each other (Belon, op. cit., p. 153).

The next references which we have met with are a quotation in Celcius, in which it is stated that Christopher Fischtner, in 1556, counted twenty-five trees,‡ and that Turner, in 1565, also found the trees to be twenty-five in number. We have been unable to verify either of these statements, not having discovered the works from which they are taken.

About the same time (1566) the Grove was visited by Christopher Furer of Haimendorf, whose quality does not appear; but from his name, and the city (Nuremberg) where his book was published in 1621, we imagine him to have been a German; and from his Latinity and knowledge of Pliny, either a priest or an educated gentleman (according to the learning of the time). "The crests of Lebanon," says he, "although covered with snow, have still to this day some Cedars, in number about twenty-five, regarding which a vulgar belief has obtained, that the Cedars of Lebanon cannot be counted, which arises from there being sometimes several trunks to the same tree, so that to those counting them the trees appear now fewer." §

In 1574, Rauwolf speaks of twenty-four trees, and, what is important, he states that he looked for but could find no young ones.‖

This absence of young ones gives us a date from which to start for the smaller specimens, now composing the major part of the Grove. They must be younger than three hundred years.

The next authority in point of date is Johannes Jacobi, who is said by Celcius to have counted the trees in 1579, and to have found twenty-six, of which two were dead, and one had only a single branch alive.¶

Radzivil, a (Polish?) prince or duke, and a knight of Jerusalem, visited the Cedars while on a pilgrimage to Jerusalem, in 1583, of which he published an account in 1614. He also found the trees twenty-four in number.**

Signor Zuallardo (or Zuallart, as he is styled by his French contemporaries), an Italian knight of the most Holy Sepulchre, made a pilgrimage to Jerusalem in 1586, and visited Lebanon on the way. He says, "Here still grow some Cedars, of those of which many were used in constructing the temple and other buildings which the kings, David and Solomon, built in Jerusalem, and of which twenty-three others, very old, still stand, spreading wide their branches."††

The Seigneur de Villamont visited the Cedars in 1590. In reference to the number of trees he says: "In consequence of what I had been told, that in counting them no one could ascertain the number, I wished to try the experiment myself three or four times, on all of which I have found always more or less. At the same time, I should say that, so far as I could judge, there are about twenty-four or twenty-five." ‡‡

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* Le Huen, Grand Voyage de Jerusalem. Paris, 1517. Feuill. 38 and 39.

† Martini à Baumgarten in Braitenbach, equitis Germani nobilissimi et fortissimi, Peregrinatio in Aegyptum, Arabiam, Palestinam et Syriam, &c., curante Donaveri. Nuremberg, 1594, p. 128.

‡ Celcius Olave, Hierobotanicon. 1748, i. p. 36.

§ Christophori Fureri ab Haimendorf, &c., Itinerarium Ægypti Arabiæ Palæstinæ Syriæ aliarumque Regionum Orientale. Nuremberg, 1621, p. 102.

‖ Leonharti Rauwolffen der Arknen Doctorn eigentliche Bescreibung der Reise um die Morgenlande, 1582, p. 280.

¶ Celcius, op. et loc. cit.

** Ierosolymitana Peregrinatio illustrissimi principis Nicolai Christophori Radzivili Ducis Olicæ et Niesvisii Palatini Vilnensis. Translated out of the Polish tongue by Thos. Weter. Antwerp, 1614, p. 27.

†† Il devotissimo Viaggio di Gerusalemme fatto et discretto in Sei libri dal Sig. Giovanni Zuallardo, l'anno 1586. Rome, 1587, p. 289 a.

‡‡ Les Voyages du Seigneur de Villamont, Chevalier de l'Ordre de Hierusalem. Arras, 1598.

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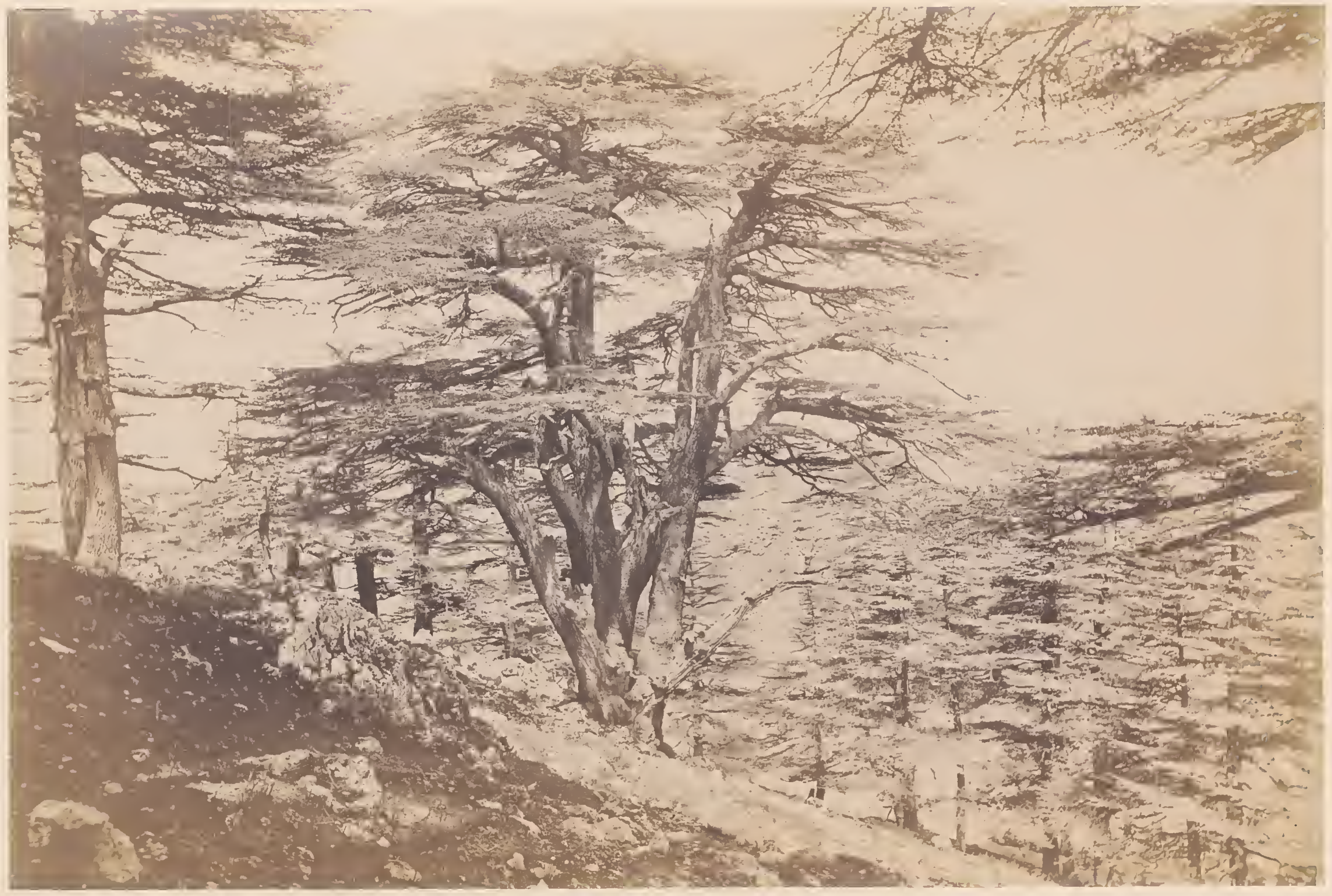

ONE OF THE LARGEST CEDARS ON MOUNT LEBANON

View Looking North from B on Map.

Photographed by F. Mason Good, Winchfield, Hants.

Father Jerome Dandini, an Italian Jesuit, who was sent to the Holy Land in the quality of Apostolic Nuncio, by Pope Clement VIII., in the year 1599, published a small volume devoted to Mount Lebanon and the Maronites, but says very little about the Cedars. He set off in May 1599, and arrived at Tripoli on the 29th of August, whence he went to the Grove and counted twenty-three trees; but another of the company only made them twenty-one.[*]

The next authority is an English one, an old book by W. Biddulph, intitled "The Travels of Four Englishmen and a Preacher" (London, 1612). They bring the number of Cedars up again to twenty-four.

Monsieur de Breves, who saw the Cedars in 1605, also found them twenty-four in number, "in a tolerably spacious situation, stretched between the summits of the mountains, but rugged and full of mounds, scattered here and there."[†]

Monsieur de Beauvais, a French nobleman, is the next in date who speaks of the Cedars; but he does not appear to have seen them, nor does he give the date of his visit, but it must have been shortly before 1615. He visited the Patriarch of Mount Lebanon; but although so near, had not the curiosity to go to the Cedars, notwithstanding that he was pressed to do so by the Patriarch. "We stayed one day in this house, and afterwards the said Patriarch wished to conduct us himself fifteen miles beyond it, to shew us twenty-three Cedars, which he assured us to have been there in the time of Solomon."[‡]

A few years later, William Lithgow, in his curious peregrination in Europe, Asia, and Africa, tells how the Grove stood about 1614: "The daily interrogation I had here (Tripoly) for a caravan's departure to Aleppo was not to me a little fastidious, being mindful to visit Babylon. In this my expectation, I tooke purpose with three Venetian merchants to go to the Cedars of Lebanon, which was but a day's journey thither. . . . . When we arrived to the place where the Cedars grow, we saw but twenty-four of all, growing after the manner of Oke trees, but a great deale taler, straighter, and greater, and the branches grew so straight out as though they were kept by art. . . . The nature of that tree is alwaies green, yielding an odoriferous smell, and an excellent kind of fruit like unto apples, but of a sweeter taste and more holesome digestion [!] The roots of some of the Cedars are almost destroyed by shepherds, who have made fires thereat, and holes wherein they sleep; yet neverthelesse, they flourish green above the tops and branches."[§]

Our next authority is the Rev. Father P. Philippius, a barefooted Carmelite Friar of the Order of the Most Holy Trinity, who visited the Cedars in 1629. He gives his account in very choice Latin, and describes them most accurately and clearly. "In Libanus," says he, "several of our European trees are found. The Cedar is peculiar to it, a tree celebrated in Sacred Scripture for its incorruptibility and size, and especially mentioned because employed in making that most magnificent temple of Solomon, for which it was conveyed from Lebanon on floats by sea. It is almost at the top of this mountain that the Cedars are produced, which the natives call *Arz*, in a tolerably broad flat place, defended from the north by the ridge of the mountain, and exposed to the south. There are one-and-twenty of the very large and oldest distinguishable; one had fallen a short time previously, and as yet appeared half burned; but, among the small ones, recently sprung seedlings are to be seen in every direction in the same plain."[‖]

Three Norman gentlemen, Messieurs Fermanel, Fauvel, Baudouin de Lannay, and a Fleming, M. de Stockhove, are the next who have left a record of a visit to the Cedars. They were there in 1630, and there is an account of their journey published in 1670. They say: "We arrived at night at the place where are the Cedar trees, so renowned and so old, that many believe that they are of the time of King Solomon. In truth, nothing can be seen more antient than these trees: they have the trunk so large, that five persons could scarcely embrace one. . . . Some say that these trees cannot be counted, and that one always finds one or two more or less. It is true that they are a little difficult to count, because they lie in two small valleys, and on a little mound of earth. Nevertheless, we counted them several times, and always found twenty-two, and one newly fallen, which had been burned towards the foot by the shepherds, who often bring their flocks there."[*]

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[*] Voyage du Mont Liban, traduit de l'Italian, du R. P. Jerome Dandini, 1675, p. 83.

[†] Relation des Voyages de Monsieur de Breves tant en Grèce, Terre Saincte et Æypte, qu'aux Royaumes de Tunis et Alger. Paris, 1628, p. 54–55.

[‡] Relation Journalière de Voyage du Levant fait et descrit, par haut et puissant Seigneur Henri de Beauvais. Nancy, 1615, p. 98.

[§] A most delectable and true Discourse of an admired and painefull Peregrination from Scotland to the most famous Kingdomes in Europe, Asia, and Africke. By William Lithgow, *Scotus*, London. Printed by Nicholas Okes, and are to be sold by Thomas Archer, at his shop in Popeshead Place, neere the Royall Exchange. 1614, p. 2.

[‖] Itinerarium Orientale. R. P. F. Philippi. Lugduni, 1649.

M. Eugene Roger, a Roman Catholic missionary, both counted and measured the Cedars about 1636. "In the midst of this plain are the Cedars of which Holy Scripture makes mention, which are in number twenty-two standing, which they say to have been since the creation of the world, and that God transplanted them, as says the Prophet, 'Cedrus Libani quas plantavit Dominus;' and if it be objected that the Deluge, having inundated the whole earth, could not have spared this place, since it even destroyed the earthly Paradise, and caused all plants to die, even the Tree of Life, it is true; but the Cedar being endowed by God with a gummy quality, this gum being very pure and bitter, conserves the wood without suffering putrefaction, which preserved them in that universal inundation. . . . Besides these twenty-two Cedars, which are standing, there are also two of the same antiquity, which are on the ground, without leaves or fruit, but still without corruption, although it has been more than a hundred years since they were laid low by the Arabs. . . . It is these twenty-four Cedars which are called the Holy Cedars, at the feet of five of which the Maronites have raised altars. . . . There is also a forest of Cedars three leagues from this, near Thadet [probably the one at El Hadith], which is where the King Solomon caused them to be cut for the construction of the Temple of Jerusalem. In like manner, around the twenty-four sainted Cedars there is like a little shrubbery of young Cedars, which proceed from the seeds which fall from the fruits, and of which the largest are only two or three feet in thickness."[†]

M. de Monconys, a French traveller, visited the Cedars in 1647, on his return from Damascus and Baalbec, and says: "There may have been twenty-five or thirty. There are some very large trees, of which the base is divided into three or four large trunks, but they only form one tree."[‡]

Thevenot, who in 1655 visited Lebanon, writes: "It is folly to say that when one counts the Cedars of Lebanon twice, one finds a different number; for there is, in all of them, only twenty-three, large and small."[§]

Castillo, a Spanish priest and apostolic preacher of some eminence, who made a pilgrimage to the Holy Land about the middle of the seventeenth century, speaks of the Cedars as objects of interest, but gives no details regarding them.[||]

In 1666, the same number as was found by Thevenot (twenty-three) remained, according to the relation of the Chevalier D'Arvieux, who counted them in company with several persons, who all arrived at the same number.[¶]

Between the years 1666 and 1669, a German priest, Brother Ferdinand von Troilo, travelled through the East, and saw the Cedars. He says nothing definite of their number, and little of their size, but alludes to the supposed impossibility of counting the trees, and explains it by some of the trees having their main stem almost covered with the earth, and four, five, or six large trunks proceeding out of it, which are counted each as a tree by some; while, by others, they are reckoned only as the branches of one tree.[**]

A few years later, in 1675, Cornelius Le Brun, or Le Bruyn, as his name is sometimes written (converted by Loudon, through a clerical error, into La Bruyere), a Flemish traveller, visited the Cedars. He is one of the few authors who happens to have made the visit in the winter time; and we thus have from him a personal account of the climate to which the Cedars are exposed during the severer portion of each year, and are able to contrast it with that at the present day. He gives two plates shewing the trees covered with snow, and himself in the act of plucking the cones. "I did not content myself with taking the fruit, but I also cut down a young tree, of which there are several, in order to carry off some wood. It is a thing commonly said, and which has, as it were, passed into a proverb, that one cannot count the Cedars of Lebanon; that is to say, that when, after having counted them once, and found a certain number, and we wished to count them a second time, we shall not find the same number that we found the first time; and, in fact, I have experienced it myself: for, on once counting the most remarkable, I found them thirty-five the first time, and thirty-six the second. But I only attribute that difference to the haste with which I counted them, and perhaps, also, to their being somewhat mixed and confused among each other, which makes it very easy to mistake." [*]

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[*] Fermanel, &c., Voyage d'Italie et du Levant. 1670, p. 209.

[†] La Terre Sainte, par F. Eugene Roger, Missionaire de Barbarie. Paris, 1646, p. 417.

[‡] Journal des Voyages de M. de Monconys. Lyons, 1665, p. 352.

[§] Thevenot, Relation d'un Voyage fait au Levant. 1664. First Part, p. 443.

[||] El Devoto Peregrino Viage de Tierre Santa, compresto par El Padre Fr. Antonio del Castillo. Toledo, 1660, p. 339.

[¶] Memoires du Chev. D'Arvieux, recueillis par le P. Labat. Paris, 1735. Vol. ii. p. 409.

[**] Ferd. von Troilo, Orientalische Reise Beschreibung in Jahren 1666-1669. Dresden, 1667, p. 49.

In 1679 Gabriel Bremond published an account of his travels in these countries,[†] which is referred to by M. Loiseleur, but which we have been unable to meet with. Loiseleur's reference to it does not relate to the number of the trees, but only to the general belief in their antiquity, viz., that they date back to Adam. In 1680 Von der Gröben found only eighteen extremely old ones. He says of Lebanon: "This is a lofty mountain decorated with various trees and fine gardens. Among the trees are the well-known and renowned Cedars often spoken of in history. Owing to its height this mountain is in many parts clothed with snow, both summer and winter. It has many fertile plains and valleys; but in many parts, more especially where the Cedars stand, it is desert and unfruitful. To see the Cedars we ascended the mountain. Of the large extremely old Cedars there stand at the present only eighteen. They are green summer and winter, the same as the Fir trees. This tree never rots, and has a pleasant odour. The fruit is like a Fir cone, but larger and thicker." [‡]

Within a few years after this, two or three of the trees seem to have fallen; for La Roque, rather a celebrated traveller, who had visited Arabia, and Palestine, and Syria, and published accounts of his journeys, visited the Cedars in 1688, and found then only twenty large trees. "We rested for two hours, and dined in the midst of this little forest. It is composed of twenty Cedars of a prodigious size, and such as there is no comparison to make with the finest Planes, Sycamores, and other large trees which we have hitherto seen. Besides these principal Cedars, one sees a sufficient number of smaller ones, and others very small—the former placed indifferently among the first, and the others in the outskirts, separated, as it were, into little troops. . . . The largest Cedar which we measured was, about the middle of its trunk, 6 feet 10 inches in girth [this should probably be 36 feet 10 inches—the figure 3 having evidently dropped out while the work was printing], and all the spread of its branches, sufficiently easy to measure, because they formed the perfect figure of a large circle, with a circumference of about 120 feet." [§]

Still more of the trees seem to have fallen during the next ten years, reducing the number to sixteen. The account given by Maundrell in 1696 is as follows: "Here are some of them very old, and of a prodigious bulk; and others younger, of a smaller size. Of the former, I could reckon only about sixteen. The latter were very numerous." [‖]

A French priest, Brother Felix Beaugrand, visited them (or appears to claim to have done so) at about the same time as Maundrell, but the number seen by him differs. He says, "One sees seven or eight of them, which they believe to have existed from the beginning of the world. They are so large that four men could not embrace them." [¶] The inference to be drawn is, that he had not been there himself, but wrote from hearsay.

Mons. Paul Lucas, who passed from Tripoli to Sidon in 1714, says, "The reader will expect without doubt that one sees many Cedars still; and I ought to tell him here that one sees very fine ones near Tripoli, but that none are to be found now on the side of Sidon, where formerly there had been many." [**]

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[*] Voyage au Levant, par Corneille Le Brun, 1700, p. 306.

[†] Gabriel Bremond, Viaggi fatti nel Egytto et cet., 1679, p. 296.

[‡] Der Herrn Otto Friedrich von der Gröeben, Orientalische Reise Beschreibung. Neue Auflage. Danzig, 1779.

[§] La Roque, Voyage de Syrie et du Mont Liban, 1722, p. 83.

[‖] Maundrell, Journey from Aleppo to Jerusalem, 1696, p. 142.

[¶] Relation Nouvelle et tres Fidèle du Voyage de la Terre Sainte, par F. Felix Beaugrand. Paris, 1700, p. 6.

[**] Voyage du Sieur Paul Lucas en Turquie, l'Asie, Sourie, Palestine, &c., 1720, p. 247.

In 1720, according to the report of a friend of Miller's,* the Grove remained in the same state as it had been found by Maundrell some twenty-five years previously, with this difference, that the circumference of the spread of the boughs of the largest tree had apparently increased from 37 yards to 66; or spread outwards 15 feet in every direction, shewing a growth of the lateral branches at the rate of 7½ inches per annum. We may mention incidentally, that the rate at which the lateral branches of old Cedars grow in this country appears to be rather less, being about six inches annually on an average of years, which, considering the rapid growth of timber in this country, is the reverse of what we should have expected.

In 1739, Dr. Pococke found fifteen large Cedars, and especially notices one with three large limbs, which we shall afterwards find referred to by M. Laure as still living in 1836. "They form a grove of about a mile in circumference, which consists of some large Cedars that are near to one another, and a great number of young Cedars and some Pines. . . . One that had the roundest body, though not the largest, measured 24 feet in circumference; and another, with a sort of triple body, as described above, and of a triangular figure, measured 12 feet on each side. I took a piece of the wood from a great tree that was blown down by the wind, and left there to rot; there are fifteen large ones standing."†

Trew quotes a visit to Lebanon made in 1755 by Etienne Schulz, who travelled over several countries in Asia. His work, however, is one of those that we have not been able to see. Trew quotes him chiefly in relation to the proper application of the native name, but mentions that he had found the trees to be 80 feet in height.‡

Between 1783 and 1785, Volney visited the Grove, or at least wrote as if he had visited it; for some authors (Pariset, Geramb, &c.) think he could not have seen them, or he would never have spoken of them in the terms he did. He said: "These so renowned Cedars resemble many other wonders. Close at hand they sustain their reputation badly. Four or five large trees, the only ones which remain, and which have nothing particular about them, are not worth the trouble that one takes to scale the precipices which lead to them."§

Dr. Labillardière visited them in 1787, and in 1791 published an account of his journey. "Of the antient forest of Lebanon, nothing remains except a group of about one hundred Cedars; seven of them are of wonderful dimensions, and some of these are thicker than 9 feet in diameter."‖

We have already noticed Seetzen's travels in 1805, but he does not specify the number of trees.

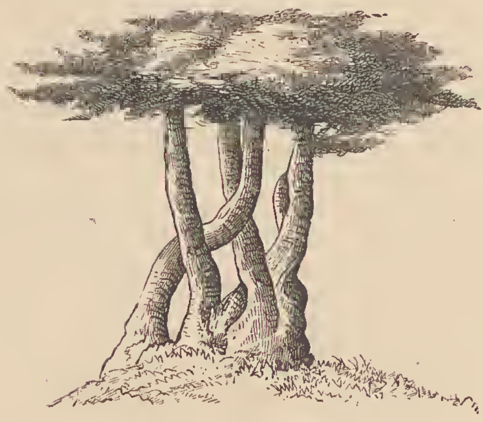
Fig. 29.

Burckhardt, five years later, or in 1810, gives a precise account; but as he divides them into four different classes, it is impossible to make out from his enumeration exactly how many of the original twenty-eight patriarchs now remained. "Of the oldest and best-looking trees I counted eleven or twelve; twenty-five very large ones, about fifty of middling size, and more than three hundred smaller and young ones. The oldest trees are distinguished by having the foliage and small branches at the top only, and by from five or even seven trunks springing from one base." Fig. 29 is a facsimile of a drawing which he gives of these several stems. "The branches and the foliage of the others were lower, but I saw none whose leaves touched the ground like those in Kew Gardens. The trunks of the old trees are covered with the names of travellers and other persons who have visited them. I saw a date of the 17th century. The trunks of the oldest trees seem to be quite dead; the wood is of a grey tint."¶

Mr. Kinneir, about the year 1813, travelled through a great part of Asia Minor, and although he

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* Miller's Dictionary of Gardening. Art. Larix. Ed. 1759.

† Pococke, Description of the East, 1745, vol. ii., part 1, p. 104; and Pococke, Observations on Syria, p. 105.

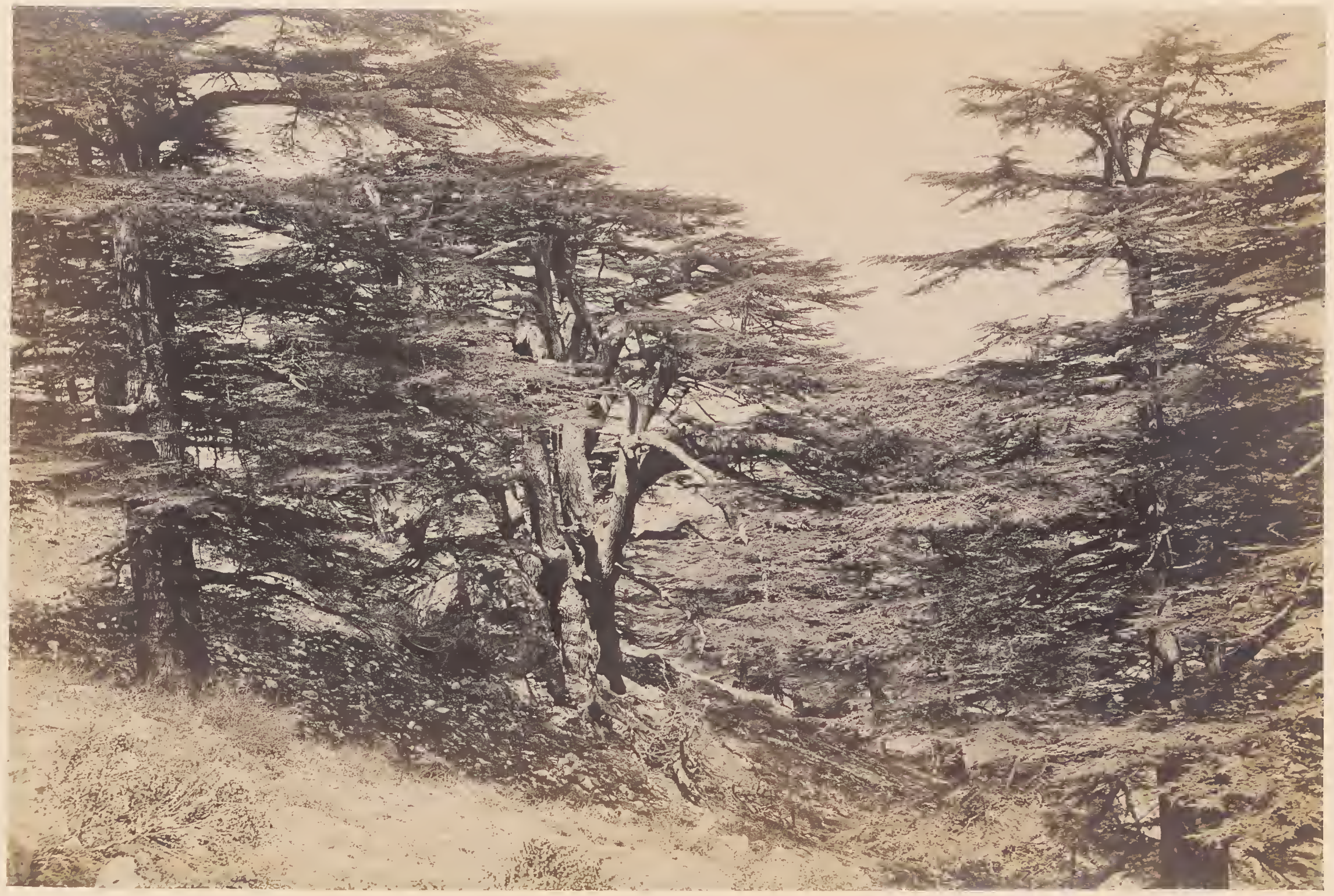
‡ Trew, op. cit., p. 409.

§ Volney, Voyage en Syrie et Egypte, 2d edit., 1787, vol. ii., p. 162.

‖ J. J. Labillardière, M.D., Icones Plantarum Syriæ rariorum. Paris, 1791. Preface.

¶ Travels in Syria and the Holy Land, by the late John Lewis Burckhardt. London, 1822, p. 18.

CEDRUS LIBANI



A GROUP OF CEDARS ON MOUNT LEBANON

View Looking North from C on Map.

Photographed by F. Mason Good, Winchfield, Hants.

crossed Cilicia more than once, found no Cedars; but his route did not extend into the mountainous parts, where alone the Cedars occur. Of those at Lebanon he says, "These trees are now only to be found in one particular spot of this great range, and that in so scanty a number as not to exceed four or five hundred."[*] But he is obviously not speaking from personal observation (his route is traced on the map he gives, and does not diverge to Lebanon), so that he can scarcely be referred to as an authority on the subject.

In 1816 Buckingham found, that "there are at present, I should think, about two hundred in number, all fresh and green. They look, on approaching them, like a grove of Firs, but, on coming nearer, are found to be in general much larger, though the foliage still keeps its resemblance. There are about twenty that are very large, and, among them, several that have trunks from 10 to 12 feet in diameter, with branches of corresponding size, each of them like large trees, extending outwards from the parent stock, and overshadowing a considerable space of ground."[†]

In 1818, Dr. Robert Richardson specifies seven as very large. "There are in this little clump two generations of trees, the oldest are large and massive, rearing their heads to an enormous height, and spreading their branches afar. We measured one of them, which we afterwards saw was not the largest in the clump, and found it 32 feet in circumference. Seven of these trees have a particularly antient appearance; the rest are younger, but equally tall, though, for want of space, their branches are not so spreading. The clump is so small that a person may walk round it in half-an-hour."[‡]

In 1818, M. L. F. Cassas visited the Cedars while travelling in the East; and although he published no account of his journey, we preserve his name here because he took on the spot a drawing of the Grove, which M. Loiseleur published in his "Histoire du Cedre."

It is curious to observe the different eyes with which men view these interesting objects. "Many men, many minds," is a proverb applicable to this, as to everything else. According to Irby and Mangles, in their travels, "The land on the mountain side has a sterile aspect, and the trees are the more remarkable as they stand altogether in one clump, and are the only trees to be seen in this part of Lebanon. There may be about fifty of them, but their present appearance ill corresponds with the character given of them in Scripture. There was not one of them at all remarkable for its dimensions or its beauty. The largest among them is formed by the junction of four or five trunks into one tree."[§]

Ehrenberg travelled through the district in 1823; but, on referring to his works, we have failed to come upon any account of the Cedars. The statements we have already quoted on his authority are from "Robinson's Biblical Researches," and Sir Joseph Hooker's paper on the Cedars in the *Natural History Review*, January 1862.

Wolff, the well-known Bokhara traveller, about this time visited the Grove, and counted thirteen large and antient Cedars and numerous small ones, making in the whole 387 trees.[‖]

An American clergyman, the Rev. J. Paxton, who visited the Grove in 1828, did not count them, which, he says, would have been no easy matter: but he counted a small section, and was disposed to think that there might be 300 to 500 trees that are above a foot in diameter, possibly 150 that may be above 2 feet, and above 50 or 60 that may be from 3 to 4 feet. Of the few he measured, the largest was 39 feet in circumference, one 32, one 29, one 28, and one 23.[¶]

Another American clergyman, the Rev. Pliny Fisk, visited the Grove about the same time, and mentions that the largest of the trees is about 40 feet in circumference, six or eight others are also very large, several of them nearly the size of the largest; but each of these is manifestly one or more trees, which have grown together, and now form one. He counted the trees, and made the whole number 389; and his companion, the Rev. J. King, who omitted the saplings, made the number 321. "I know not," he says, "why travellers have so long and so generally given twenty-eight, twenty, fifteen, and five, as the number of the Cedars. It is true, that of those of superior size and antiquity, there are not a greater number, but then there is a regular gradation in size, from the largest down to the merest sapling."[*]

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[*] Journey through Asia Minor, Armenia, and Koordistan. By J. M'Donald Kinneir, 1818.

[†] Travels among the Arab Tribes inhabiting the Countries east of Syria and Palestine. By James Silk Buckingham. 1825, p. 476.

[‡] Travels along the Mediterranean and Ports adjacent, in company with the Earl of Belmore, during the years 1816, '17, '18, &c. By Robert Richardson, M.D. London, 1822, vol. ii. p. 573.

[§] Irby and Mangles' Travels in Egypt, Nubia, Syria, and Asia Minor. 1833, p. 65.

[‖] Missionary Journal, 1823 and 1824.

[¶] Rev. J. Paxton, as quoted by Kitto in his Physical Geography and Natural History of Palestine, 1841.

The recent evidence of Admiral Washington's expedition, however, proves that this last statement is inaccurate, and that the older trees can easily be separated from the younger.

The Cedars were visited in 1829 by Dr. Pariset, who in terms rather grandiloquent and sentimental, gave an account of his visit in a letter to M. Loiseleur Deslongchamps, which was published by him in his "Histoire du Cedre" in 1837. He says: "The large Cedars, in fact, are very few in number: I do not think that I counted more than a dozen: I did not measure their circumference, but I had still before my eyes the columns, which, to the number of nearly one hundred and thirty, fill one of the halls of the palace of Carnac; they are nearly 40 feet in girth; each is very nearly the dimensions of the large Cedars. . . . As to the smaller Cedars, different in age and shape, I do not think that I say too much in carrying the number up to four or five hundred."

M. Geramb, a monk of La Trappe, who visited the Grove in 1832, incidentally tells us the number of the large trees, in refuting the depreciatory remarks of Volney. "Instead of 'four or five thick trees,' I have counted at least thirteen or fourteen, not only as thick as the thickest trees that I ever met with in my peregrinations, but so thick that several of them are six or seven fathoms in circumference. Some at a certain height divide into five or six principal branches, which, issuing from the same stem, form so many new trees, planted as it were in the trunk, and of such diameter that two men cannot span them."[†]

In the same year (1832), Lamartine visited the Grove, and his account almost exactly corresponds with the present state of the Grove. He says: "These trees diminish in number every age. Travellers formerly counted thirty or forty—more recently, seventeen; and at a later date but twelve. There are now but seven, which, from their massiveness and general appearance, may be fairly presumed to have existed in Biblical times. . . . There still remains a little grove of young Cedars, appearing to me to form a group of from four hundred to five hundred trees or shrubs."[‡]

M. Leon de Laborde, the celebrated traveller and artist, travelled through Syria and the East about the same time; and in the large work which he published shortly afterwards, his pencil has preserved to us admirable views of this scenery. After describing the ascent he says, "In less than half an hour we seat ourselves in the shade of these grand old trees. In former times they covered Lebanon; now-a-days they are scattered on three small hillocks, surrounded like an amphitheatre with more elevated summits, forming a barrel-shaped valley, so that one can only see that clump of trees at some distance from one direction. An hour before reaching Bechaia the guides had pointed out their tops. This clump of about four hundred trees detaches itself upon the snow in complete isolation. . . . It is an oasis of Cedars in the midst of a desert of snow. . . . Here they reign despotically. They are alone, and spread around them without any mixture the agreeable odour which is peculiar to them. There are no more than seven, entirely old and very large. One of these is more than 50 feet in circumference."[§]

Our next authority is M. Laure, an officer in the French Marines, who, in company with the Prince de Joinville, visited Mount Lebanon in 1836. His father gives an account of his journey in the *Cultivateur Provençal*, which is quoted by Loiseleur Deslongchamps in his "Histoire du Cedre." "Fifteen of the sixteen Cedars mentioned by Maundrell are still alive, but are all more or less in a state of decay; and one of them is remarkable for three immense trunks proceeding from the same stump, at a short distance above the soil. Another, one of the healthiest of the old trees, though perhaps the smallest, measured 35 feet 9 inches in circumference. All the trees are much furrowed by lightning, which seems to strike them more or less every year. In the midst of these old trees, are about forty other Cedars, comparatively young, though the trunk of the smallest of them is from 10 to 12 feet in circumference. . . . It is not alone at Lebanon that Cedars are found. Above the village of Ehden one sees large trees, which the distance does not permit one to recognise, but which the natives affirm to be Cedars. There is not one young Cedar in all the wood of El Herzé." *

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[*] Memoir of the Rev. Pliny Fisk, late Missionary to Palestine. Boston, 1828, p. 327.

[†] Pilgrimage to Palestine, 1840, vol. ii. p. 1015.

[‡] Pilgrimage to the Holy Land, made during a Tour in the East. By Alphonse de Lamartine. Translated by Hill, 1837, vol. ii. p. 69.

[§] Voyage de la Syrie. By Leon de Laborde. Paris, 1837, p. 31.

Lord Lindsay, in the same year (1836), passed through the Grove on his way back from Baalbec and Anti-Libanus. He says: "Several generations of Cedars, all growing promiscuously together, compose this beautiful Grove. The younger are very numerous; the second-rate would form a noble wood of themselves, were even the patriarchal dynasty quite extinct: one of them, by no means the largest, measures 19¼ feet in circumference, and, in repeated instances, two, three and four large trunks spring from a single root; but they have all a fresher appearance than the patriarchs, and straighter stems, straight as young Palm trees. Of the giants there are seven standing very near each other, all on the same hill—three more a little farther on, nearly in a line with them. And in a second walk of discovery after my companions had lain down to rest, I had the pleasure of detecting two others, low down on the northern edge of the Grove—twelve, therefore, in all, of which the ninth from the south is the smallest; but even that bears tokens of antiquity coeval with its brethren. The stately bearing and graceful repose of the young Cedars contrasts singularly with the wild aspect and frantic attitude of the old ones, flinging abroad their knotted and muscular limbs like so many Laocoons, while others, broken off, lie rotting at their feet; but life is strong in them all." †

Monsieur Eusèbe de Salle, who describes himself as the First Interpreter of the African Army, visited the Cedars about 1838. He describes them as "scattered over three or four hillocks, which may be a quarter of a league square in extent. In arriving from the west, one meets at first, or, rather, one leaves to the left, four or five old gnarled trees, which seem to act as sentinels before the principal group. The guides make you arrive under the shade of the five or six most antient Cedars. . . . To explain the diversity in the numbers of trees reckoned by travellers at different times, at periods many of them very near each other, during which a knotty, muscular and contorted tree could certainly not have had time to grow, let us say that the trunks of most of the old trees are not perfectly well defined. There is one that may be counted either for one, or two, or three trees soldered together by long vicinity. . . . But I ought to add that the principal group of these Nestors is not the only group. To the west and north of the cluster we find several which have already the appearance of age, and on the bark of which the names of travellers form long dynasties." ‡

The Rev. Dr. Fisk, Prebendary of Lichfield, visited "the Grove" in 1841, and thus describes them: "On nearing the Cedars the clump assumes the stateliness of a forest. The young trees which skirt the plantation are noble specimens, and justly claim our admiration. We wound our way through the midst of them with the 'smell of Lebanon' about us, and soon reached those venerable trees which have received the reverence of ages. The antient ones are twelve in number, seven of them clustered together, and the other five at various parts of the Grove. I did not measure the girth of any, but I felt their gigantic proportions while reclining beneath their shade. And are these the trees—the very trees of which Solomon spake; and which have supplied the inspired penmen with imagery to symbolise spiritual dignity and the glory which is of righteousness—why should they not be? I know not. Certainly they bear traces of the lapse of ages upon ages. They appear as old as Lebanon itself—as if they had never been seedlings. If they are not the very trees, surely they have sprung from the seeds of the most antient ones. The seven which are clustered together go up like gigantic pillars, and their interlaced arms above—each in itself a

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* Laure in Cultivateur Provençal. Vol. i. p. 317.

† Letters from Egypt, Edom, and the Holy Land, by Lord Lindsay. London. 4th ed. (1847), p. 349.

‡ Pérégrinations en Orient par Eusèbe de Salle. Paris, 1840. P. 127.

vast tree—form a verdant dome through which the vertical sun penetrates not. I delighted in cherishing the persuasion of their full antiquity, as I mused on Israel's history, and thought of the glory of Lebanon. As I gazed upon them I felt that description must always sound like exaggeration. I have seen noble Cedars in Europe—the growth of centuries—but compared with those of Lebanon they are but saplings."[*]

In 1842, Lord Castlereagh says: "There are about two hundred trees in all, occupying a knoll which, taking the irregularity of surface into account, covers about six or seven acres. There are one or two stragglers, but at no great distance from the clump. . . . Some of the trees bear the names upon their bark of Laborde, Burckhardt, and Lamartine, with several others. The Cedar of Lamartine was measured, and we found it to be above 24 feet in girth. There are not above seven or eight of them magnates, but a goodly supply of smaller ones surrounds them; and there seems no chance at present of the race dying away or being destroyed."[†]

Mr. Kinglake, the author of "Eothen," thus speaks of the Cedars in that work: "The group of Cedars remaining on this point of Lebanon is held sacred by the Greek Church, on account of a prevailing notion that the trees were standing at the time when the temple of Jerusalem was built. They occupy three or four acres on the mountain's side, and many of them are gnarled in a way that implies great age; but except those signs, I saw nothing in their appearance or conduct that tended to prove them contemporaries of the Cedars employed in Solomon's temple" (Eothen, 1st edition, 1844, p. 307). What other signs Mr. Kinglake could expect to find of their contemporaneity with Solomon, except the appearance of great age, he does not say.

The Rabbi Joseph Schwarz writes in 1850, and says that "Cedars El Arz are found nowhere except on Mount Lebanon. But in Syria, in the vicinity of Aleppo, there are likewise Cedars, though in very limited numbers;" but he does not give his authority for the statement.

Mr. James Laird Patterson says of them, in June 1850: "The Cedars appear about two hundred in number, of which some eight or ten are very large. We measured three of the largest, and found them respectively 37 feet 10 inches, 28 feet, and 27 feet in girth."[§]

Van der Velde, whose map of Palestine, by the way, is the best which has been yet published, naturally examined the whole country minutely, while procuring materials for his map. He spent a considerable time in the Holy Land in 1851 and 1852; and he says of the Cedars: "You know from the narratives of different travellers that the old Cedars, now only twelve in number, stand on a broad cleft of Lebanon at 6300 feet above the sea. You know that those venerable trees, perhaps the oldest in the world, and which some think must have sprung up soon after the Flood, are giants above all other trees growing, and that this dozen is surrounded by an aftergrowth of 400 younger Cedars, more or less."[‖]

Dr. Robinson, the author of the well-known and able "Biblical Researches," visited Lebanon and the Cedars in 1852. He says: "The Cedars, which still bear their antient name, stand mostly upon four small contiguous rocky knolls, within a compass of less than 40 rods in diameter. They form a thick forest, without underbrush. The older trees have each several trunks, and thus spread themselves widely around; but most of the others are cone-like in form, and do not throw out their boughs laterally to any great extent. Some few trees stand alone on the outskirts of the Grove; and one especially on the south is large and very beautiful. With this exception, none of the trees came up to my ideal of the graceful beauty of the Cedar of Lebanon, such as I had formerly seen it in the Jardin des Plantes. I made no attempt to count the trees; probably no two persons would fully agree in respect to the old ones or in the number of the whole. Yet I should be disposed to concur in the language of Burckhardt, who says, 'Of the oldest and best-looking trees I counted eleven or twelve; twenty-five very large ones, about fifty of middling size, and more than three hundred smaller and younger ones.'" *

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[*] A Pastor's Memorial of the principal Localities of the Holy Land, by the Rev. George Fisk, LL.D. 1843, p. 395.

[†] Lord Castlereagh's Diary of a Journey to Damascus, 1847, p. 272.

[‡] A Descriptive Geography and Brief Historical Sketch of Palestine, by Rabbi Joseph Schwarz. 1850, p. 306.

[§] Journal of a Tour through Egypt, Palestine, Syria, and Greece, 1852, p. 311.

[‖] Narrative of a Journey through Syria and Palestine in 1851 and 1852, by C. W. N. Van der Velde. 1854, p. 478.

The Rev. John Wilson, F.R.S., visited the Holy Land in 1853, and has given an excellent account of his observations in his "Lands of the Bible." His line of travel brought him to the Cedars by the return route from Baalbec. The following is his account of his visit to them: "After drinking a cup of warm milk, which a goatherd kindly offered to us, we commenced our descent to the 'Cedars.' As first seen by us from Jebel Makmel, they appeared merely as a speck of green beyond the snowy wreaths which intervened between us and them. The perpendicular fall of the mountain to them is 2400 feet, for they are 6000 feet above the level of the sea; but the road winds so cautiously down the side of the mountain, that loaded horses and mules can get to them without much difficulty. We made all possible haste to them, and we remained a couple of hours beneath their hallowed shelter. They stand on what may be called the shoulder of Lebanon, on ground of a varying level. They cover about three acres. The venerable patriarch trees, which have stood the blasts of thousands of winters, amount only to twelve, and these not standing close together in the same clump; while those of a secondary and still younger growth, as nearly as can be reckoned, number 325. A person can walk easily round the whole Grove in twenty minutes. The most curious instance of vegetable growth which we noticed in it was that of two trees near its western side, stretching out their horizontal branches, and, after embracing, actually uniting and sending up a common stem. We measured all the larger trees, one of which at least we found to be forty feet in circumference. We were sorry to observe the names of many travellers, including that of Lamartine, the poet of France, most savagely cut on their trunks. A monk came to us to beg some aid for the erection of an oratory under their shade, but we told him that God had already made a temple there, and that no other was required. In order to gain our favour, he proceeded, with the help of an assistant whom he had, to strike down some of their boughs to present them to us. Whilst we protested against his injury of the old trees, we carried off the pieces which he had cut. An examination of the wood—which is remarkably compact and solid, and of a fine grain, and capable of being cut and carved into ornamental pieces of furniture, and highly and delightfully scented—has led several of the Edinburgh botanists and carpenters to dissent from the description of the tree given by Dr. Lindley, who, doubtless judging it from its degenerate specimens in England, calls it 'the worthless though magnificent Cedar of Mount Lebanon.' †

"On the precise age of the Cedars it is of no use to speculate. Both Mr. Graham and I thought that the patriarchs may be as old as even the Christian era; but this was forming an opinion from their general appearance, without any distinct data. Though they are grand and magnificent trees, they are by no means so symmetrical and beautiful as those of a younger growth which have grown up under their shelter. They may have escaped the destructive axe of the Turks just because of their irregular form, and the consequent difficulty of turning their timber to account. They may never have been put into the ground by the hand of man, but their seed may have been strewn there from their parents, under the providence of the great Creator." ‡

The following is the Rev. J. L. Porter's account of the Cedars as he saw them in August 1853: "On first viewing the Cedars from the heights above Hazrun, I experienced feelings of disappointment. I had pictured in my mind far different scenery in the district around them. Imagination had painted rugged cliffs and wild ravines, and these remnants of antient noble forests clinging to the mountain-side like Pines on an Alpine peak. But here was a vast semicircular bosom in the bare white mountains, whose sides slope down from the rounded summits with uniform regularity, without a crag, or peak, or patch of verdure to relieve the monotony. The mountain-tops were now streaked with snow, but even this almost blended

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* Biblical Researches. By the Rev. Dr. Robinson. 2nd edit., 1856, iii. p. 588.
† Gardener's Chronicle, i. p. 699. See also Biblical Encyclopedia, under Erez.
‡ The Lands of the Bible Visited and Described. By John Wilson, D.D., F.R.S. Edin., 1857, p. 393.

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with the white limestone, and gave little variety to the scene. In the very centre of this vast bosom I saw a solitary black speck, apparently out of place. It was the Grove of the Cedars. On approaching the brow of the hill, where my eye took in the sublime glen of the Kadishes, with its terraced banks and numerous villages peeping out from the dark masses of foliage, this view was finer and more varied, but still a long naked slope separated the Cedars from the grandeur of the glen below.

"It was not till I had entered the precincts of the sacred Grove that feelings of disappointment vanished. Then the beautiful fan-like branches of the younger trees, the gracefulness of their pyramidal forms, and, above all, the huge trunks of the patriarchs themselves, which one must walk round to form a true conception of their vast proportions, excited feelings of unmingled admiration. And when all the associations of their high antiquity, antient glory, and sacred interest swelled upon my memory, the wondrous attraction that had for centuries drawn crowds of pilgrims to this lonely spot from the ends of the earth, became at once manifest. The Pine groves of the Metu are far more picturesque, and the oak forests of Hermon and Bashan are far more extensive and beautiful; but Cedar beams were laid on the Lord's house at Jerusalem, and Cedar forests were the glory of Lebanon, as Lebanon was the glory of the Land of Israel.

"Only a few, perhaps a dozen, very antient trees now remain. There are, however, many others of very respectable dimensions and antiquity, some of which are four or five feet in diameter. The whole Grove is compact, the trees growing close together on the summit and sides of a little limestone knoll. In the centre a small rude chapel has been constructed within the last few years, the roof of which is wholly of Cedar wood. In a chamber attached to it resides the deacon, who is the recognised guardian of the place, and expects from all travellers some little present in exchange for a few cones or a fragment of a branch which the winter's snow may have broken down. I was present during the celebration of morning mass by two stranger bishops who had just arrived. During the performance the deacon brought me the traveller's book, with a pencil, from off the altar! He requested me to write my name in it. This is certainly a more rational mode of recording a visit than the sacrilegious practice of carving the letters on the bark of some noble tree. In fact, the trunks of *all* the most antient trees, with one exception, are now all hacked, hewn, and disfigured by this barbarous propensity of travellers. There may be read by the curious, names of illustrious savans, joined with elsewhere unheard-of individuals. Noble lords, too, figure beside the autographs of their dragomen; and other associations equally ennobling are formed to excite the amusement and indignation of posterity." *

The writer of a "Bundle of Old Letters" in *Good Words* gives the following graphic account of the Grove. Although without date, from the allusions in some of the letters (as, for example, to the siege of Sebastopol, then going on), we assign to them a date of about 1854: "About 400 of them remain, but only a few of them heard the sound of Hiram and his axe-bearing host. If these few had been more accessible, I believe the modern Hirams would soon have demolished them. They all stand within a very small circuit, and the seven oldest are called 'the Apostles.' These seven alone are believed to be real antients, *i.e.*, to date from a time before the kings of Israel, mighty, wise, and strong. They stand in the centre of the whole group, surrounded and guarded by their descendants and kinsfolk. . . . The huge boles, some of them measuring between forty and fifty feet in circumference, send forth to a great distance their fantastically-twisted branches laden with mighty cones. The lofty tops shoot high up towards heaven, and when, in their august presence, we imagine the whole mountain covered as it once was by such giants, we can well comprehend how the Cedars of Lebanon should be so often used in Scripture as emblems of strength, and majesty, and glory." †

Sir Joseph Hooker is our next authority. He visited the Cedars in company with Admiral Wash-

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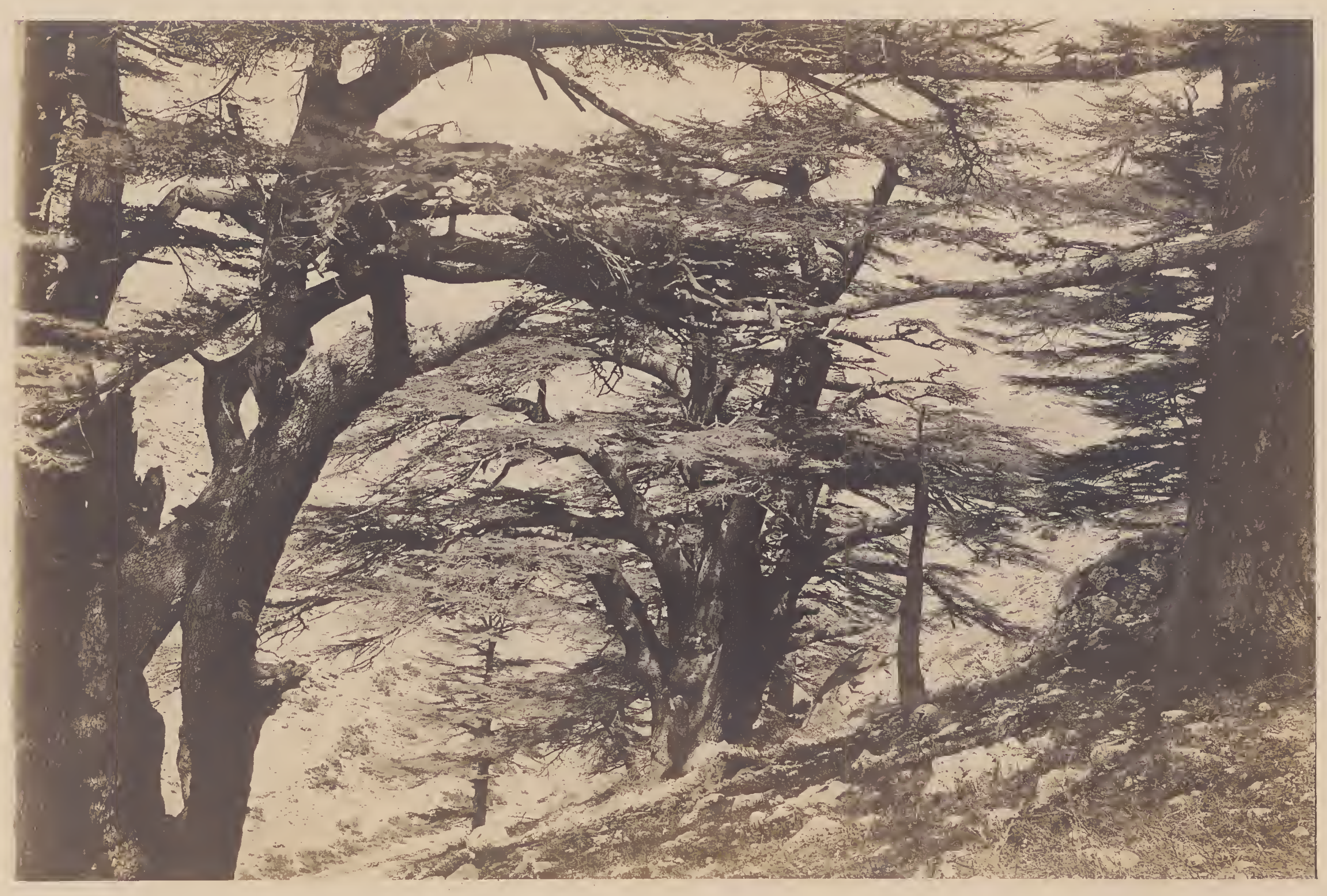
* Five Years in Damascus. By the Rev. J. L. Porter. 1855, ii. p. 301.

† A Bundle of Old Letters from a Wanderer. *Good Words*, October 1863, p. 701.

CEDRUS LIBANI



THE LARGE CEDAR NEAR THE CHAPEL ON MOUNT LEBANON

View Looking South West from D on Map.

Photographed by F. Mason Good, Winchfield, Hants.

ington in 1860, and his excellent paper, and an admirable survey of the spot made by the latter and Captain Maunsell, supply us with as much information on every point connected with them, and the specimens which they brought home, and which are now preserved at Kew, tell us as much regarding their age and growth, as we can expect to know, until the winds lay low one of the patriarchs, and allow us by inspection of the annual rings composing its trunk to obtain positive proof of its age. From Sir Joseph's paper and Admiral Washington's map, (which, being Government work, may be relied on for absolute accuracy and authenticity,) we learn that the number of trees is about four hundred, which are disposed in nine groups, corresponding to as many hummocks of moraines. They are of various sizes, from about 18 inches to upwards of 40 feet in girth. The two largest are on the slope north of the chapel, and stand near a boulder. Then, a little to the south of these, and close to the chapel, there is one large tree; and still farther to the south and east, on another hummock, three large trees. In all, there are only eight trees which are above 20 feet in girth. These we should divide into two ages: the oldest, consisting of the first three, which were in 1860 respectively 40 feet, 38.10 feet, and 36.9 feet in girth; the second age, consisting of the next three, respectively 33 feet, 29.8 feet, and 28 feet in girth; and a third age, consisting of the remaining two, 22 and 21 feet in girth. There are only fifteen trees above 15 feet in girth, and these all occur in two of the nine clumps, which two contain 180 trees. Only two others exceed 12 feet in girth, and these are found in immediately adjoining clumps, one on one side and one on the other of those above mentioned. We think, therefore, that we may class them with the rest of the fifteen; they were, perhaps, stunted specimens, or possibly exceptional strays of a subsequent growth, which escaped the destruction which befell any others of the same age. Deducting the eight of above 20 feet, we should thus have another group of seven in number between 15 and 20 feet, or of nine in number between 12 and 20 feet in girth. Then there are two eastern clumps containing 163, and five western clumps containing 156 trees, none of which were above 12 feet in girth, but of which those to the westward (or down valley) side of the others are the smallest. On this side, therefore, says Sir Joseph, the latest addition to the Grove has taken place. None of these, however, were less in girth than a foot and a half or thereby. From the annual rings of two of the youngest trees, sections of which were brought home by Sir Joseph and Captain Maunsell, we know that their age is about 188 years.

In 1861 the Cedars were visited by Sir John Tobin, of Ballincolly, Cork, and his wife, Lady Tobin. The latter says: "The Cedars are of many different growths, and it is utterly in vain to speculate upon the distinct antiquity of some of them. The tall and graceful stature of the younger trees, with their dark-leaved fan-like boughs, the enormous trunks, some of them more than 40 feet in girth, the gnarled and widely-spreading sombre branches of the aged patriarchs, which speak with silent tongue of other days, must almost forcibly remind the stranger of their world-renowned and antient glory."*

We gather also a little additional information as to the dimensions of some more of these largest specimens from a short notice of a visit to the Grove made in 1862 by Mr. Ridgway of Fairlawn. He says: "Of the oldest trees, we could make out only nine, or, at the outside, ten." Mr. Ridgway measured eight of the largest trees at three feet from the ground, and found them to girth as follows: 21 feet, 22 feet, 28 feet, 29 feet 8 inches, 33 feet 4 inches, 36 feet 9 inches, 38 feet 10 inches, and 40 feet respectively. "It was impossible for us to have counted the trees, as the snow was three feet deep and soft, and the sides of the plateau very steep. I am quite of opinion that the Cedar and Deodar are the same tree. There is a young tree growing about 50 yards west of the chapel in the middle of the Grove, of exactly the same form and habit as a Deodar in the park here [Fairlawn, near Tunbridge]; the same graceful drooping habit; the same light silvery green; and having none of the usual rigid horizontal form of the Cedar. The remainder of the younger race of trees vary from 5 to 20 feet in girth; some are as tall and branchless as Poplars; some not 30 feet high, gnarled and stunted."†

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* The Land of the Inheritance. By Lady Tobin, 1863, p. 421.

† Ridgway, in "Gardener's Chronicle," 21st June 1862.

Mr. Tristram's account of this interesting spot is the latest which we have to record. He visited it in 1864, taking it on his return route by Damascus and Baalbec. Of the Grove itself, this is his account: "The snow had been so far melted by the summer sun that we were able to ascend by the highest pass, very close to the summit of Lebanon, 10,000 feet high, and descend almost directly upon the Cedars. . . . All was brown and bare, save on one dark spot where stood a clump of trees, the famous Cedar Grove. Viewed from above, the effect of that Grove is much more remarkable than when, as is generally the case, it is approached from below. Insignificant perhaps in itself, it here becomes the one noticeable feature in a landscape otherwise peculiarly bare and monotonous. . . . A few separate trees stood out from the mass, but the general appearance of the Grove was of a thick clump, as though it had been a fragment of some antient forest." *

To the devout spirit of Mr. Tristram, "the breeze, as it soughed through the dark boughs, seemed to breathe sounds of solemnity and awe, and to proclaim these to be the 'trees of the Lord,' 'the Cedars of Lebanon,' which He hath planted." But the charm of solitude was no longer there, for within the last few years a hideous Maronite chapel has been built in the centre of the Grove, which is still more unwelcome from several fine trees having been cut down to supply wood for its erection; and as an adjunct to his chapel, the priest has collected around him many of the goatherds of the neighbouring villages, who spend the summer under the rude shelter of the huts.

The trees are not too close, nor are they entirely confined to the Grove. In the topmost boughs, ravens, hooded crows, kestrels, hobbys, and wood owls were secreted in abundance; but so lofty are the trees that Mr. Tristram found the birds out of reach of ordinary shot. The older trees have each several trunks, and spread themselves widely round, but most of the others are of cone-like form, and do not send out wide lateral branches.

The following table shews, in a condensed form, the facts relating to the number of the trees contained in the foregoing quotations :—

| Date of Authority. | Name of Author. | Number of Very Large Trees. | Number of Large Trees. | Number of Young Trees. |
|---|---|---|---|---|
| 1487 | Le Huen | ... | ... | |
| 1508 | Baumgarten | ... | ... | |
| 1550 | Belon | ... | 28 | |
| 1556 | Fischtner | ... | 25 | |
| 1565 | Turner | ... | 25 | |
| 1566 | Furer | ... | 25 | |
| 1574 | Rauwolff | ... | 24 | None. |
| 1579 | Jacobi | ... | 26, and 2 dead | |
| „ | Brenning | ... | 23, and 3 dead | |
| 1583 | Radzivil | ... | 24 | None. |
| 1585 | Zuallardo | ... | 23 | |
| 1590 | Villamont | ... | 24 or 25 | |
| 1598 | Harrant | ... | 26 | |
| 1599 | Dandini | ... | 23 | |
| „ | De Beauvais | ... | 23 | |
| 1600 | Biddulph | ... | 24 | |
| 1605 | De Brèves | ... | 24 | |
| 1612 | Lithgow | ... | 24 | |
| 1629 | Philippius | ... | 21, and 1 fallen | |
| 1630 | Fermanel | ... | 22, and 1 newly fallen | |
| 1636 | Roger | 14, including 2 on the ground | 22 | A little shrubbery of young Cedars (largest 2 or 3 ft. in girth). |
| 1647 | Monconys | ... | 25 or 30 | |
| 1650 | Boullaye de Gouz | ... | 22 | |
| 1655 | Thevenot | ... | 23 | |
| 1658 | Cuzzy and Quaresimis | ... | 23 | |
| 1660 | Castillo | ... | ... | |
| 1666 | D'Arvieux | ... | 23 | |
| 1667 | Von Troilo | ... | 36 | |
| 1675 | Le Brun | ... | ... | |
| 1679 | Bremond | ... | 20 | |
| 1680 | Von der Groben | ... | 18 | |
| 1688 | La Roque | ... | 16 | Very numerous. |
| 1696 | Maundrell | ... | ... | |
| „ | Beaugrand | 7 or 8 | ... | |
| 1714 | Lucas | ... | 16 | Very numerous. |
| 1720 | Miller | ... | 15 | Great numbers. |
| 1721 | Petit Queux | ... | 12, and 15 blown down | |
| 1738 | Pococke | ... | ... | 100 |
| „ | Karte | ... | 18 | |
| 1755 | Schulz | ... | ... | |
| 1784 | Volney | 4 or 5 | ... | |
| 1787 | Labillardière | 7 | ... | |
| 1805 | Seetzen | ... | ... | |
| 1810 | Burckhardt | ... | 12 | 25 very large, 50 of middling size, and 300 small and younger ones. |
| 1813 | Kinneir | ... | ... | 400 to 500. |
| 1816 | Buckingham | ... | 20 | |
| 1818 | Richardson | 7 | ... | |
| „ | Cassias, Deslongchamps | Two generations of trees | ... | Many. |
| 1823 | Bové | ... | ... | |
| „ | Irby and Mangles | ... | ... | |
| „ | Erhrenberg | ... | 13 | 387 |
| 1824 | Wolff | ... | ... | |
| 1828 | Paxton | ... | ... | 300 to 500 |
| „ | Pliny Fisk | 5 | 15 | 389 |
| 1829 | Pariset | ... | 12 | 400 to 500 |
| 1832 | Geramb | ... | 12 | 400 to 500 |
| „ | Lamartine | 7 | ... | 400 to 500 |
| 1835 | Addison | ... | 7 | |
| 1836 | Laure | ... | 15 | 40 |
| „ | Lord Lindsay | 7 | 12 | 400 |
| 1840 | Salle | ... | 12 | |
| 1841 | G. Fisk | ... | 12 | |
| 1842 | Lord Castlereagh | 7 or 8 | ... | About 250 in all. |
| 1844 | Kinglake (Eothen) | ... | ... | 400 |
| 1850 | Schwarz | ... | ... | 200 |
| „ | Patterson | 8 or 10 | ... | 200 |
| 1851 | Van der Velde | ... | 12 | 400 |
| 1852 | Robinson | ... | 12 | |
| 1853 | Wilson | ... | 325 | |
| „ | Porter | ... | about 12 | |
| 1854 | *Good Words* | 7 | ... | 400 |
| 1860 | Hooker | 6 | 17 | 400 |
| „ | Washington | 6 | 17 | 400 |
| 1861 | Tobin | ... | ... | |
| 1862 | Ridgway | 6 | 10 | |
| 1864 | Tristram | ... | ... | |

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* Tristram, *op. cit.*, p. 623.

The preceding numbers, and the size of the younger trees, prove that a group of old Cedars had stood in the Grove from 1487 to the present time, numbering twenty-eight in 1550, but now reduced, by the casualties of time, to nearly the half of that number. These old trees appear to be of various ages; and it seems not an improbable supposition that they have existed since long before the days of Solomon. Then there is a wide gap, probably more than 1000 years, which separates those of the second size from the older ones; and again, a gap of not less duration between these second-class specimens and the modern young ones.

How are these alternate periods of growth and barrenness to be accounted for; and to what date must the birth of each new crop be referred? We think we can imagine how some of them originated. Loudon, for instance, embodying the statements of several authors, says "About this period, paying a visit to the Cedars of Mount Lebanon seems to have been considered as a kind of pilgrimage; and as every visitor took away some of the wood of the trees to make crosses and tabernacles, the Patriarch of the Maronites, fearing that the trees would be destroyed, threatened excommunication to all those who should injure the Cedars, and at the same time exhorted all Christians to preserve trees so celebrated in holy writ. The Maronites were only allowed to cut the branches of these trees even once a-year, and that was on the eve of the Transfiguration of our Saviour, which festival occurs in August; and, consequently, at a suitable period for visiting the mountain. On this festival, the Maronites and pilgrims repaired to Mount Lebanon, and passing the night in the wood, regaled themselves on wine made from the grapes grown on the mountain, and lighted their fires with branches cut from the Cedars."

There remains the question, why no plants have grown up subsequent to the young trees noticed by the travellers whose works we have quoted? It is the concourse of travellers to visit the Grove. It was formerly the devotees of religion who did the mischief—it is now the devotees of science and travel. Not that they do the injury themselves in *propria persona*. It is indirectly that they do it, through inducing herds of Arabs to follow in their wake, or to lie in wait for them in the Grove to prey on them, or profit by their largesse. With them these parasites bring their goats up to browse, and it is the goats that destroy the young seedlings. Not only is the Grove thus spoiled, but from the same cause there are no young saplings at the Grove above the village of Ehden, nor can there be any at any other grove which is subject to the like pasturage. Of course, too, now that a chapel has been actually built in the very midst of the Grove, and people reside there, the mischief has become past cure, past hope. Independently of this, however, a week or two's invasion by the squatters and their goats in any year would be sufficient to destroy all the young plants of that and the two or three preceding seasons. A very little care and protection would be sufficient to enable them again to make progress, as we see from the multitudes of seedlings in those groves whose remoteness and inaccessibility have preserved them from the visits of man—and goats.

The facts which we have above given regarding the history of these trees are genuine, and authenticated by the best authority,—quotations from the writings of those who have visited them themselves. Naturally, however, in the case of such interesting objects, there are a number of statements of less value, traditions and tales flying about, which, by repetition, find their way into works of more or less authority, and which it may be right that we should caution our readers against accepting until better vouched.

*Modern History in Britain.*—The exact date of the introduction of the Cedar of Lebanon into this country is not known. Nor is it even certain to whom the credit of having introduced it belongs. There are three or four places at which old Cedars are growing, or have grown, which have been referred to the date of Queen Elizabeth. One of these was an old tree at Hendon, which was blown down on New Year's Day, 1779. There is an unsupported tradition that this had been planted by Queen Elizabeth herself. That sovereign died in 1603. If it were planted by her, it must have been before 1600; as for
the

the last two or three years of her life her health had greatly failed. Its dimensions are not conclusive either for or against the truth of the tradition, but are at least perfectly consistent with its being no older than the date usually assigned to the introduction of the Cedar. Its height, when blown down, was 70 feet, and the diameter of the space covered by its branches 100 feet. The girth of the trunk, at six feet from the ground, was 16 feet; at 12 feet from the ground, where the insertion of the branches swelled it, it was 20 feet in girth; and the limbs varied in girth from six feet to 12 feet.

In its native country (see *infra*), each foot of girth represents, in all probability at least, not less than 70 years; but the average of its rate of growth in this country, after eliminating exceptional cases, is, up to 50 or 60 years, about one foot in five years; up to 100, about one foot in six years; but after that, its rate of increase is very much slower. A tree 16 feet in girth, therefore, may fairly be reckoned as having lived at least 100 years; it may be older, and if in an unfavourable situation, much older. But the situation at Hendon was good, and therefore the age of the tree, when blown down, was probably not far off 100 years, which would take its birth back to 1679.

Sir John Cullum, in a letter published in the *Gentleman's Magazine* (p. 138, 16th Feb. 1779), in which he announces the destruction of the Hendon tree (which he characterises as "a superb tree, *una nemus*," and "perhaps the finest Cedar in England"), discusses its age, and the question when and by whom the Cedar was introduced into England. He says:

> "I find not with exactness, when or by whom the Cedar was first introduced into England. Turner, one of our earliest herbarists, where he treats of the 'Pyne tree and other of that kynde,' says nothing of it. Gerard, published by Johnson in 1636, mentions it not as growing here; and Parkinson, in his 'Theatrum Botanicum,' 1640, speaking of the *Cedrus Magna Conifera Libani*, shews that he had never seen it. 'The branches, some say, all grow upright, but others straight out.' Evelyn, whose discourse on forest trees was delivered in the Royal Society in 1662, observes that Cedars throve in cold climates 'even where the snow lay, as I am told, almost half the year; for so it does on the mountains of Lebanon, from whence I have received cones and seeds of these few remaining trees. Why, then, should they not thrive in Old England? I know not, save for want of industry and trial.'
>
> "Hitherto I think it is pretty plain the Cedar was unknown among us, and it appears probable we are indebted to the last-mentioned gentleman for its introduction into England; for he informs us, in the same paragraph from which I made the above quotation, that he had received cones and seeds from the few trees remaining on the mountains of Lebanon.
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> "Something better than twenty years afterwards we find, among Mr. Ray's philosophical letters, the following curious one, addressed to him from Sir Hans Sloane:—'London, March 7, 1684–5.—I was the other day at Chelsea, and find that the artifices used by Mr. Watts have been very effectual for the preservation of his plants, insomuch that this severe enough winter has scarce killed any of his fine plants. One thing I much wonder to see, the *Cedrus Montis Libani*, the inhabitant of a very different climate, should thrive so well as, without pot or greenhouse, to be able to propagate itself by layers this spring. Seeds sown last autumn have as yet thriven well, and are like to hold out; the main artifice I used to them has been to keep them from the winds, which seem to give a great additional force to cold to destroy the tender plants.'
>
> "This is the first notice that has occurred to me of the cultivation of the Cedar among us."

A similar claim to being the oldest tree in Britain, and also to having been planted by Queen Elizabeth, has been set up on behalf of an old tree in front of Enfield Palace, known as the Enfield Cedar, but its dimensions are even less than those of the Hendon tree. In 1788 it was 45 feet 9 inches high, though nine feet had been broken off by the high wind of 1703. In 1793 it measured 12 feet in girth at three feet from the ground; and in 1809, at 3 feet 10 inches from the ground, its girth was 13 feet 1 inch. In 1821, the girth was 19 feet 9 inches at one foot from the ground, and 64 feet 8 inches in height. In 1835, it was 15 feet 8 inches at five feet from the ground, and its height in the same year was 64 feet 8 inches. In 1849 it measured 19½ feet in girth. But, besides the doubt suggested by its minor dimensions, there is much stronger traditional evidence in favour of its having been planted by Dr. Uvedale. Dr. Uvedale was born in 1642; he was master of the grammar-school at Enfield about the time of the great plague (1665); and he died in 1722. He was a great florist, and is said to have devoted so much of his time to his garden as to have been threatened with removal from his situation on that account by the authorities who had appointed him.

There is a tradition that one of Dr. Uvedale's scholars who travelled, had a commission from the Doctor to bring a plant of the Cedar of Lebanon from Mount Lebanon, and that he brought a seedling, which has grown into the tree now standing.

Another instance, which is referred to the date of Queen Elizabeth, is some Cedars at Tivoli, near Cork, which are said to have been planted by Raleigh when he set sail from that harbour on his last expedition.

"Sir Walter Raleigh sailed from Cork Harbour on his last unfortunate expedition to the West Indies on the 19th of August, 1617. His vessel lay in the river somewhere between Dundanion and Tivoli. I have been pointed to Cedars at Tivoli, which tradition says were planted by Sir Walter Raleigh's own hands."*

A fourth place, where the trees are supposed to be of the same period, is Woburn Abbey; but although their dimensions almost seem to warrant such a belief, we can find no extraneous evidence in its support.

The truth seems to be that the Cedar was introduced between 1664, the date of Evelyn's "Sylva," and 1678. Ayton, in his "Hortus Kewensis," says that the date was 1683, that being the year in which the Cedars at Chelsea were planted. But they were three feet high when planted, and we must therefore allow four or five years for them to have reached that height.

The allusions to the Cedar in Shakspere, Spenser, and our older poets, may no doubt be adduced as incidentally supporting the view that the tree had been already introduced into England: but on scrutinising them, they will all be found either to be palpably inspired by the recollection of passages in the Bible, as—"He shall flourish, and, like a mountain Cedar, reach his branches to all his plains about him;" or to be equally applicable to any other tall tree, as "thus yields the Cedar to the axe's edge." None of them shew any personal acquaintance with it.

The oldest trees in Britain, therefore, were probably the Hendon great tree, the Enfield tree, the Chelsea trees, and perhaps the trees above alluded to at Woburn Abbey, which are spoken of as 250 years old.

Loudon follows the suggestion of Sir John Cullum, and attributes the introduction to Evelyn, and shrewdly suggests that, supposing him to have raised plants from the cones mentioned by him in the passage above quoted, he may have supplied plants to Dr. Uvedale; as the Doctor went to reside at Enfield in 1665, the year after Evelyn published his "Sylva."

Lord Holland somewhat vaguely claimed the honour for his ancestor, Sir Stephen Fox, who, he says, had imported from the Levant the first Cedar planted in England. The tree so imported was planted at Farley, near Salisbury, the native village and burial-place of Sir Stephen Fox, and was cut down in 1813, being then 16 feet in girth. Lord Holland also believed that it was he who planted either the Cedars at Chelsea or at Chiswick.

There seems little doubt that, as regards the Chelsea Cedars, this is a mistake. It has more appearance of probability as regards the Chiswick trees, because Chiswick was formerly the property of Sir Stephen Fox, who died there in 1714 or 1715; and, although the trees there are not so old as the Chelsea ones, their appearance seemed to justify the possibility of their having been planted before his death; and we incline to think it not improbable that Sir Stephen may really have planted them a year or so before he died. The number of annual rings of the one which was last cut down was 145, or perhaps one or two more—which would bring the apparent date of its germination to 1720; but it is quite possible that the swell of the roots may have encroached on the butt, and that in the heart of this butt, below where the saw passed, there may be evidence of five or six years' additional growth during the first years of the tree's life (particularly if it were slow, as it often is at that stage), which would carry it into Sir Stephen's epoch.

There is in the British Museum a curious set of old engravings of Chiswick House, in one of which the avenue of Cedars on the south of the house is plainly delineated. Fig. 30 is a copy of the part of the plate in which they are seen. Judging from their appearance, we should guess their age, at the time they were figured, at about thirty years. The engravings themselves are without date; but the names of the artist, engraver, and publisher, are engraved at their foot; and we learn from Mr. G. W. Reid, the head of the print department in the British Museum, that they were published in 1753. This, supposing our estimate of the age of the trees in the plate to be correct, would make the date of their birth about 1723.

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* "History of the County and City of Cork," by the Rev. Charles B. Gibson, vol. ii. p. 33, 1861.

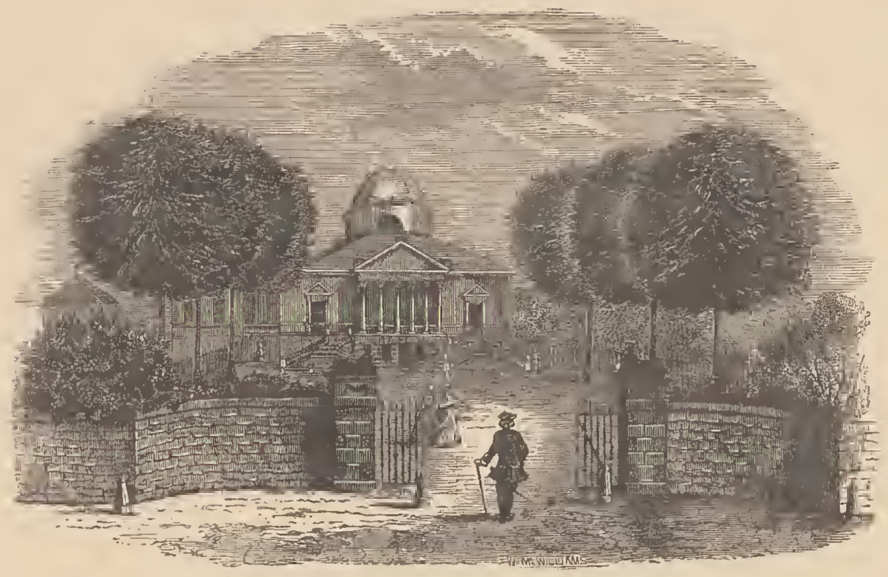
Fig. 30.—Mop-headed Cedars at Chiswick.

The form of the Cedars in this plate shews that they had been pruned up in the mop fashion. Those on the south side of Chiswick House (which are the trees delineated), still bear marks of having been so treated, all having straight bare stems; and we know from other sources that this was a favourite mode of treating the Cedar when first introduced. Whether in consequence of this treatment or not, there is a marked difference between the size and health of the trees in the avenue on the north, and that on the south side of the house, where the branches have not been pruned away, but actually rest on the ground; the latter being considerably larger (the two largest respectively 16 feet 8 inches and 14 feet in girth, while the girth of those on the north side is only 13 feet), and the tree which has been cut down, and another opposite which the wind threatened to uproot, and which was propped up with massive beams like a dangerous house, are both on the north side of the house, and are of those which have been pruned.

But to return to the enumeration of our oldest Cedars, Loudon mentions that, according to a tradition in the family of Ashby, whose seat is at Quenby Hall, in Leicestershire, one of the first Cedars raised in England was from seeds brought from the Levant by Mr. William Ashby, a Turkish merchant, and given by him to his nephew, George Ashby, who is supposed to have planted the old Cedar in front of Quenby Hall, between 1680 and 1690.

Whoever was the first to introduce it, there can be little doubt that the example was speedily followed, and that many people who had relations with the Levant must have received seeds after it once became known that the tree would grow in the open air. The renown of "the Grove," and the numerous pilgrimages to it, as well as its lying directly on the road to the interior, and only some 20 miles from the sea, would render the procuring of seeds very easy.

The individual specimens of trees which have been planted, reared, or brought from abroad by eminent persons, or which are known to have been planted at particular dates, or in celebration of public events, have an interest of their own. There is a number of specimens with interest of this kind to be found among the Cedars, and it may be worth while to preserve notes of those that we know for future identification.

We have already alluded to the apocryphal traditions of Cedars planted by Queen Elizabeth and Sir Walter Raleigh. Among the realities, we have mentioned those planted by Evelyn, by Sir Stephen Fox, by Collinson, by Dr. Uvedale, and by Jussieu. Besides these, we may note the following, of which we have cognisance. At Barne, near Beaconsfield, there are many Cedars that are said to have been planted by Waller the poet. But we should doubt this, because Waller died in 1687, only some seven years after the date which we have accepted as that of the introduction of the Cedar; and when, moreover, he must have planted them at an age (82) when, as Johnson tells us, "he for age could neither read nor write." Still it is possible. He retained his faculties to the last, and the lines he composed in his old age are considered not inferior to the effusions of his youth. He was buried at Beaconsfield, where he lived. His mother resided there before him, and for a time after his returning from exile he lived at a place called Hall Barn, "a house built by himself near Beaconsfield," and which, for aught we know, may be the original of what is now called Barne. If he planted any trees near that place, it must therefore probably have been between 1650 and 1687.

A tree often spoken of in old horticultural books as the "Hammersmith Cedar," was cut down in 1836, which had the reflected historical interest of growing in the garden of a house which was once the residence of Oliver Cromwell, and in which it was said that he had signed the warrant for beheading Charles I. It was of no great height (53 feet), considering its age, which was 118 years; its girth was 15 feet 6 inches.

The Cedars at Wilton were raised by the Countess of Pembroke between 1710 and 1720, and were kept in pots at her window, until, growing too large, they were planted upon the lawn. An earlier date (1665) is assigned to them by a writer in the *Gentleman's Magazine*, but no reliable ground for preferring that date is given: the former date is that adopted by Loudon.

At High Clere, in Berkshire, are several fine Cedars: the two oldest, which are not the largest, were raised in 1739 from a cone brought from Lebanon by Dr. Pococke in the previous year. They were transplanted to their present situation when they were 30 years old, and it may be due to this circumstance that they have been outstripped by other specimens. The largest at High Clere was raised from a cone borne by one of the Wilton Cedars in 1772.

At St. Anne's Hill, in Surrey, there is a tree whose date is known from its having been planted by the Hon. Mrs. Fox in 1794. It was 50 feet high in 1837, being then 43 years of age.

At Powis Castle, there is a fine Cedar bank with about 150 Cedar trees in it, which were left in pots when Edward Earl of Powis (then Lord Clive), went as governor to Madras in 1798. They were planted out after his return in 1805.

At Further Barton, Cirencester, there is a specimen planted on 2d May, 1816, on the marriage of Leopold with the Princess Charlotte, daughter of George IV.

At Pope's villa, near Twickenham, there is a Cedar which that poet must often have seen. It was 85 feet high in 1837, when Loudon had it measured; but was only 12 feet in girth.

There is a specimen at Rossie Priory, near Johnstone, in Perthshire, which was planted by the late Lord Kinnaird to celebrate the return of the Hon. Fox Maule, afterwards Lord Panmure, for the county of Perth. Its height in 1863 was 33 feet 6 inches; and its girth, three feet from the ground, 4 feet 2 inches.

There must be many more memorial Cedars of which we have not heard.

*Age and Rate of Growth.*—The Cedar varies greatly in its rate of growth, according to locality, and more especially is the difference great between that in its native mountains and in the moister and more equable climate of England. We shall first look to its age and rate of growth in Lebanon.

In forming our opinion of the ages of the old trees there, the only data beyond dispute that we have to guide us are the section of a limb of one of the oldest trees, which lay dead on the ground, and of the trunks of two young trees brought home by Sir Joseph Hooker and Admiral Washington, in 1860. The sections of the trunks of these two young trees give 188 rings for the one, which is 16 inches in diameter, and 178 rings for the other, which is 12½ inches in diameter. The section of the branch of the old tree is eight inches in diameter, exclusive of bark, and presents an extremely firm, compact, and close-grained texture, and has no less than 138 rings, which are so close in some parts that they cannot be counted without a lens. This specimen, further, is both harder and browner (almost as dark as Laburnum, but redder) than any English-grown Cedar or native Deodar, and is as odoriferous as the latter, and, as already said, even in the Museum at Kew still retains some of its fragrance. Sir Joseph Hooker,

however,

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however, says, that these being the characters of an old lower branch of a very old tree, are no guide to the general character of the wood on the Lebanon, and still less to that of English-grown specimens, which are always very inferior in colour, odour, grain, and texture. So far as regards the English-grown specimens, this is unquestionably true; but why it should be so as regards the general character of the wood in Lebanon, we cannot see. No doubt the older the tree, the closer the rings and grain, and the harder the texture; but allowances must be made for that in all timber. We must begin by taking the actual facts, and make the allowances afterwards. Sir Joseph Hooker says that, calculating only from the rings in this old branch, the youngest trees would average 100 years old; the oldest, 2500—ages which, he thinks, are, no doubt, widely far from the mark. We are not sure that they are so, at any rate on the score of too great age. Estimated by the rate of growth of English rapidly-grown specimens, their ages might be reckoned as low, respectively, as 500 and 200 years. But the mere fact that, according to that test, the old trees at Lebanon, which we read of as being of as great size upwards of 300 years ago as they are now, might be only 200 years old, disposes of the reference to English ordinary growth by a *reductio ad absurdum.*

The truth is, that we can learn little or nothing from the growth of the Cedar in this country, for both the rate of its growth and the qualities of its timber have departed most materially from their natural character in Syria. We must trust to nothing but Lebanon evidence for Lebanon growth; and looking to that, we see that the sections of the two younger trees give between them an average of 53 years per foot in girth, while that indicated by the old branch is 70.

At this rate, a tree 40 feet in circumference would be 2000 years old; but as in all trees, after a certain age, the breadth of the annual rings diminishes as the tree increases in age and size, it must be still older.

The above branches are the only actual timber that we have to judge from; but we must not leave out of view the information that may be gathered from the incidental statements as to the growth of the younger tree in the above data.

We shall not shrink, therefore, from acknowledging our belief that the oldest trees are much older than the days of Solomon. It is no doubt possible that Sir Joseph Hooker's suggestion that a change may have taken place in the climate may be true—although the supposed fact on which he rested it, the occurrence of no Cedars but the Grove, is found to be erroneous. A change has certainly taken place in the cultivation of the country and the fertility of the soil. Where formerly the earth produced abundantly, now she is barren; and we may be all wrong in ascribing that to the maladministration of governments, the wastefulness of man, and the desolation of wars. It may be a climatal change; and when the largest Cedars have fallen, and we can look into their heart, we may find that the growth for the first few hundred years has been rapid, and that it is only in the outer circles that the extraordinary slowness of growth (which we now find to be the character of the young trees) has begun to shew itself. This is possible, but it is without proof, and we rather think the facts point the other way. Until we have some such proof, we think 4000 or 5000 years a very moderate estimate of their age; and we are the more disposed to believe this slow growth that we can cite the progress of young trees under our own observation growing under unfavourable circumstances in our own country, as perfectly in keeping with such a rate of growth.

At Duncrivie, in Kinross-shire, two young Cedars, which were planted about forty years ago, have grown, the one no more than three feet high, and 3½ inches in girth at the ground, and the other only a trifle more. This is a growth of not quite an inch in height, and rather more than a fifth of a line in growth in a year, or about the same rate of growth as that of the exterior rings of the smaller Lebanon specimen, or double that of the last 68 rings of the larger specimen. A small branch cut off near the base of one of these shews 16 annual rings, of which all but three (which correspond to the years 1856, 1857, and 1858) are most minute. It has no top, but is assuming the flat tabulated form of an old tree. There is no appearance of its ever having lost its top. We observe incidentally that the inaptitude of the climate for the Cedar at Duncrivie does not apply to the Deodar, which grows as rapidly there as anywhere else.

The supposed slow growth of the Cedar on Lebanon was threatened with a contradiction by some beams of wood found by Layard in the ruins of Nineveh, one of which he sent home to the British Museum, where it is now deposited. He says:

> "Standing one day on a distant part of the mound, I smelt the sweet smell of burning Cedar. The Arab workmen excavating in the small temple had dug out a beam, and the weather being cold, had at once made a fire to warm themselves. The wood was Cedar; probably one of the very beams mentioned in the inscription as brought from the forests of Lebanon by the king who built the edifice. After a lapse of 3000 years it had retained its original fragrance. Many other such beams were discovered, and the greater part of the rubbish in which the ruin was buried consisted of charcoal of the same wood. It is likely that the whole superstructure, as well as the roof and the floor of the building, like those of the temple and palace of Solomon, were of this precious material" ("Discoveries in the Ruins of Nineveh and Babylon," 1853, p. 357).

Now, the specimen in the British Museum has the annual rings by no means close, but at regular and tolerably wide distances; the rate of growth being nearly a line each year—the breadth of 10 spaces each containing 10 rings selected as a fair average, being successively 13 lines, 11, 8, 9, 9½, 8, 9½, 7, 6, 7½. If this were Lebanon timber, we should, therefore, be compelled to admit that the growth had not always been slow in Lebanon, or at least not so in other forests from which the beam in question might have been taken. There are, however, objections to receiving the beams in question as timbers from Lebanon. One is, that the late Robert Brown, by a microscopical examination of the intimate structure of the timber, pronounced it to be the wood of the Yew, not of the Cedar; and on the strength of his determination it has been so received by botanists. This we do not think a good objection, for we have doubts of the soundness of Mr. Brown's determination. The block of timber has every resemblance to that of the Cedar, and little or none to that of the Yew. It is nearly of the colour of the Cedar, and not so dark or so rich a brown as the heart-wood of the Yew. The texture is open and soft like that of the Deodar or English grown Cedar, and not so close and firm as that of the Yew. Its annual rings are scarcely more consistent with the usual growth of the Yew (which are very close, one we have just counted giving 90 rings in 26 lines) than they are with those of the Cedars growing on Mount Lebanon; and, on examining a radial section of the timber under the microscope, we have found our suspicions confirmed, and it almost certainly proved to be, at any rate, not a Yew. There is a simple and marked distinction between the structure and timber of the true Conifers and of the Yews. A cross section shews no difference; but a longitudinal section made in the radial direction shews an additional, or apparently additional, structure in the Yews beyond what appears in the Conifers. The Yew, in addition to the discs, has a half uncoiled spiral vessel, like an elastic spring, between the walls of each tube. No such spiral vessels are to be seen in a section of the Nineveh Cedar. When placed in Canada balsam, examined without this precautionary preparation, there is to be seen a slight cross line or scratch here and there, simulating the crossing of two spiral vessels; and this, we imagine, is what has deceived Robert Brown. No doubt if the spiral vessels or traces of them could be seen at all in any part, that must settle the question, as they are never seen in coniferous wood; but the cross lines in question occur very rarely, and only here and there, instead of being everywhere present as in the Yew, and may probably be due to the disintegration of the timber from the long keeping. At any rate, under the best methods of examination, no spiral vessels are to be seen. Another objection to its being Yew is the fragrance spoken of by Mr. Layard, which he smelt when the beam was burning, which is not a property of the Yew, while it is of the Cedar.

We are driven, therefore, to admit that the timber is not the Yew; and next, that there are strong grounds for believing it to be Cedar. But it does not follow that it is Lebanon Cedar. It may be Deodar, which, it is not disputed, has a more rapid growth than the Lebanon tree. Indeed, it seems almost impossible that it could be anything but the Deodar. Lebanon is 300 or 400 miles from Nineveh as the crow flies, and the route by land is impassable to carriages or any means by which heavy logs of timber could be conveyed; and in those days there was no sea route known from Syria to Persia, even supposing them to be carried down to the Mediterranean and shipped there. The sea passage from the mouth of the Indus to the Tigris, on the contrary, was an easy coasting voyage, in constant use; and we know that the Deodar has been from time immemorial a main article of traffic on the former river. Of the two, therefore, in the absence of anything leading to a contrary conclusion, there can be no doubt the Deodar was most likely to be the timber used in the building of Nineveh; and Layard's beam, if it be of Deodar Cedar, need not affect in the least our calculations as to the growth of the Cedar in Lebanon.

We shall now turn to the growth of the Cedar in our own country.

M. Loiseleur Deslongchamps and Mr. Loudon both took pains to contrast the growth of the well-known Cedar in the Jardin des Plantes, the first introduced into France (planted in 1734), with that of two in the Botanic Garden at Chelsea, which are believed to be the oldest in Britain (planted in 1683); but the comparison is marred by the Chelsea trees, during the first eighty-three years, having stood near a pond, into which their roots extended, and from that cause made exceptionally rapid progress. Under that stimulus, the trees, when eighty-three years old, exceeded 12½ feet in girth at two feet from the ground, while the Jardin des Plantes tree, when seventy-eight years old, had only made 9½ feet; but after the pond had been filled up, the Chelsea trees there did not add three feet to their circumference in sixty-eight years, or nearly as long a time as they had previously taken to grow 12½, the largest being only about 15 feet in 1834. It would also appear that two of them had had their lower branches cut in, to give light to an orangery before which they had been placed; and Miller tells us that they suffered so much in consequence, that they were scarcely half so large as the two others which had been permitted to grow at liberty. Which were the trees that had been so treated we do not know.

One, and only one, of the Chelsea trees still remains, but sections of the penultimate tree are preserved in the British Museum, so far as its decayed state would allow, and from these specimens we have taken the following details. A portion of the interior of the trunk, very much dry-rotted, but still holding together, shewed the following rate of growth, viz.: the first 10 rings occupied 14 lines; the next 10, 22 lines; third, 17 lines; fourth, 14 lines; fifth, 13 lines; which gives an average rate of growth of 16 lines, or an inch and a third in ten years.

Another specimen, which was next the bark, gives the following slower rate of growth: the first 10 inner rings occupied 21 lines; second 10, 11 lines; third, 5 lines; fourth, 9 lines; fifth, 7 lines; or, taking the 30 outer rings only, an average growth of 7 lines per ten years, as opposed to 16.

A large limb furnishes an entire section, and gives the following growths on its widest side, the growths on the other side being not so much developed, viz.: the first innermost 10 rings have a breadth of 24 lines; second, 30 lines; third, 28 lines; fourth, 22 lines; fifth, 21 lines; sixth, 18½ lines; seventh, 18 lines; eighth, 21½ lines; ninth, 30½ lines; tenth, 20 lines; eleventh, 18 lines; twelfth, 14 lines; thirteenth, 12½ lines; fourteenth, 9 lines; fifteenth, 5 lines; making a total of 153 rings, having an average of 16 lines, as in the first specimen.

The dimensions of the tree in the Jardin des Plantes were, according to the data supplied to us by M. Henri Vilmorin, as follow: in 1786, 4 feet 9 inches in girth, at 5 feet above the ground; in 1812, 5 feet 11 inches in girth, at 6 inches from the ground (Loiseleur Deslongchamps); in 1864, 10 feet 8 inches, at only 3 feet from the ground; in 1867, 11 feet 3 inches, at 5 feet from the ground. At the present date (1882) it is 13 feet 2 inches, at 6 feet from the ground, and its height is 52 feet 9 inches.

These measurements do not quite correspond with those given by Loudon, which were as follows:—Girth at the ground: 1786, 4 feet 9 inches; 1802, 7 feet 10 inches (Dutour in Nouv. Dict. d'Hist. Nat., iv. 449); 1818, 8 feet 8 inches; 1834, 10 feet 6 inches (Mirbel in Return paper to Loudon); and its height 80 feet, instead of only 46 feet 2 inches as at present.

We prefer the measurements of M. Vilmorin as the more accurate, seeing that they accord throughout better with their present state, as to which there can be no dispute.

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But the impossibility of placing plants growing in distant localities, under anything like the same circumstances, renders all such comparisons of little value. All that we can obtain from them with certainty is additional proof of what is sufficiently well known already, that, under favourable circumstances, the Cedar grows with as much rapidity as any other conifer, and under unfavourable circumstances, as slowly, perhaps more slowly. The favourable circumstances seem to be a rather moist and mild climate, and the unfavourable conditions, a bleak one, with a short and cold summer.

The average rate of growth in this country seems to be about a foot in length each year, until it reaches fifty years of age, when the rate gradually decreases.

We have culled from Loudon's "Arboretum," Mr. Palmer's tables, and our own memoranda, about two hundred measurements of Cedars of all ages, and, on calculating their averages, we have obtained the following results :—

| Number of Trees. | Age in Years. | Average Height in Feet. | Growth in Height each Year. | | Number of Trees. | Age in Years. | Average Height in Feet. | Growth in Height each Year. | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Inches. | Lines. | | | | Inches. | Lines. |
| 20 | 20 | 20 | 12 | 0 | 7 | 70 | 55 | 9 | 3 |
| 6 | 25 | 24 | 11 | 2 | 4 | 90 | 72 | 7 | 3 |
| 35 | 30 | 31 | 12 | 2 | 0 | 100 | 83 | 9 | 9 |
| 10 | 50 | 50 | 12 | 0 | 2 | 120 | 60 | 6 | 0 |
| 12 | 60 | 50 | 10 | 0 | 13 | 100 to 200 | 73 | 8 | 3 |

Those above sixty years of age are more irregular in their height, which may be due to the casualties of life thinning them off, as well as to their smaller numbers rendering the averages less characteristic.

The averages of thickness calculated in a similar manner (although from a smaller number of cases), give the following, viz. :—

| Number of Trees. | Age. | Girth. | | Average Breadth of Annual Rings per Annum. | Number of Trees. | Age. | Girth. | | Average Breadth of Annual Rings per Annum. |
|---|---|---|---|---|---|---|---|---|---|
| | | Feet. | Inches. | Lines. | | | Feet. | Inches. | Lines. |
| 1 | 20 | 4 | 6 | 5 | 10 | 60 | 8 | 6 | 3¼ |
| 2 | 25 | 4 | 0 | 4 | 2 | 70 | 10 | 6 | 3⅓ |
| 10 | 30 | 8 | 0* | 9½ | 4 | 90 | 14 | 0 | 3¼ |
| 8 | 35 | 5 | 0 | 3½ | 3 | 100 | 12 | 2 | nearly 3 |
| 8 | 50 | 8 | 0 | 3¼ | 5 | 100 to 200 | 15 | 0 | ... |

* Average disturbed by exceptional cases.

Keeping out of view the averages applicable to the thirty years' period, which are disturbed by a few exceptionally flourishing examples, we see that after the first flush of youth is passed the increase goes on steadily at the same rate, until the tree reaches one hundred years; and we may thus give a tolerable guess at the age of a tree from its girth, provided we know that it is above thirty and under one hundred, and growing under no exceptionally favourable or unfavourable conditions—that is to say, exceptional to the average of this country.

This rate of growth is confirmed by the details which Loudon gives of the breadth of the annual rings of one of the largest trees at Whitton, which had been blown down in the violent storm of wind in November 1836. He says that "The lower part of the trunk, after being squared, measured nearly 4 feet on the side; and the annual growths were so large, that twenty of them measured 6½ inches across. The largest of these annual layers was no less than half-an-inch, and the smallest exceeded an eighth."

We have also had the opportunity of ascertaining the rate of growth in thickness of one of the old Cedars at Chiswick House, which was giving way, and was cut down in 1866. Mr. Edmonds, the late head gardener there, carefully counted the annual rings, after oiling across the butt, so as to make them more distinct, and found that the tree had lived 145 years, or it may be a year or two more. It must, therefore, have been planted in 1720, or perhaps a few years earlier, as its first growths might be below the line where the saw passed. This gives a somewhat lower ratio than that we have above arrived at. Reckoning from the centre,

| | | Average Width of each Annual Ring. |
|---|---|---|
| The 1st 10 rings | occupied 3½ inches, | 4 lines. |
| The 2d " | " 1¾ " | 2 " |
| The 3d " | " 2¼ " | 2¾ " |
| The 4th " | " 2½ " | 3 " |
| The 5th " | " 2¾ " | 3¼ " |
| The 6th " | " 2½ " | 3 " |
| The 7th " | " 2¼ " | 3 " |
| The 8th 10 rings | occupied 1⅛ inches, | 1⅓ lines. |
| The 9th " | " 2⅛ " | 2½ " |
| The 10th " | " 2¼ " | 2¾ " |
| The 11th " | " 1⅛ " | 1⅓ " |
| The 12th " | " ¾ " | 1 " |
| The 13th " | " ¾ " | 1 " |

The rings shew a great uniformity, until the tree reaches about one hundred years of age, when the breadth of the rings began to diminish.

We may remark, while speaking of the old trees at Chiswick House, that the largest of them is now (1882) 18 feet in girth; whereas, we learn from Loudon that, in 1837, forty-five years previous, it was only 13½ feet, shewing an increase at the rate of about a foot in girth every ten years—that is, 4 inches in diameter—equal to an average breadth of 2½ lines for each annual ring during these forty-five years.

In October of the present year (1882) Mr. Barron, Superintendent of the Royal Horticultural Gardens, informs us that there are now fifty-one large trees in existence at Chiswick House (three were blown down a few years ago). All are in fair condition and quite healthy in appearance, having made good growth last season; in the autumn of which, however, some large branches were broken. In company with Mr. May, the present head gardener there, Mr. Barron measured seven of the largest trees, and ascertained that their circumference, at about three feet from the ground, was as follows:—

| | ft. | in. |
|---|---|---|
| No. 1 | 18 | 0 |
| " 2 | 16 | 8 |
| No. 3 | 15 | 0 |
| " 4 | 14 | 9 |
| No. 5 | 13 | 6 |
| " 6 | 13 | 4 |
| No. 7 | 12 | 10 |

The largest has a short bole, breaking out into a number of spreading branches.

Mr. Edmonds informed us, in 1866, that the branches of the largest tree had since 1830 spread laterally 18 feet—that is, 6 inches per annum. He says: "In the year 1830, when I first came to this place, I happen to have noticed how far one of the branches of a Cedar was from the pedestal of a vase. There was then 12 feet from the point of the shoot to the side of the stone pedestal next to it, and now it has reached 6 feet beyond this—making almost exactly 18 feet of growth in the thirty-six years. This branch is on the south side of the tree. The above accords with my observations generally on the growth of all the Cedar trees. Some seasons the growth is not more than four inches; a warmer summer will produce six; and I have noticed a growth of eight inches added when the season has been one of unusual heat." At the present time (1882) Mr. Barron informs us that the branch in question is 8 feet beyond the pedestal, so that the lateral growth in the past sixteen years has been 2 feet only.

On the above points M. Loiseleur Deslongchamps arrives at very much the same conclusions as those above mentioned. He says:

> "Like several other trees which live for centuries, the Cedar grows but slowly in its first years; one of its young plants scarcely makes more than 3 or 4 inches in height at the end of its first summer, and twice as much when it is two years old. Its growth continues inconsiderable during the three or four following years; but reckoning for seven or eight years, especially when it is planted in the open air, its increase in height and in thickness becomes much more rapid: it increases often more than a foot in height each year. Desfontaines measured at the estate of the Duhamel du Monceau, a Cedar thirty-three years old, which was about 40 feet in height; and a growth of more than four feet in one year has even been seen (Bosc. Nouv. Dict. d'Agric., 1821, vol. iii., p. 531). I have said above what its increase in thickness might be, and I believe that this tree is that of all others of the same family in which the increase is greatest in this respect. We have besides already seen that its increase in thickness decreases with years as much as it advances in age, but this is a law which is common to all other trees" (Loiseleur Hist. du Cédre).

It does not appear that the fast growing Cedars in this country have by any means the longevity of their more deliberate ancestors in Lebanon. A large proportion of those which were first planted are already gone, or are fast hastening to decay. The Hendon great tree was blown down in 1779. The Hillingdon tree, 132 years old, and between 15 and 16 feet in circumference, was blown down in 1790. That at Enfield, although still a fine tree, is much maimed. Of the four trees originally planted in the Chelsea Botanic Garden, two went long ago; the third fell about twenty years ago, and only one now remains, and it is getting very scraggy. It has not increased in height for many years—not since Loudon wrote—and, instead of increasing a foot in girth every five years, as is the normal rate at a younger stage, it has only increased half-a-foot in these thirty years.* The two trees at Hopetoun House are decaying rapidly. Those now standing at Chiswick, as Mr. Barron informs us, are still sound; but it is scarcely time for them to go yet, their full age, even for this country, not having yet been attained. M. Vilmorin tells us that, of two Cedars planted by his grandfather at Verrières, near Paris, so recently as 1816, although one is sound and prosperous, having produced the immense growth of 81 feet in height in the short space of sixty-five years, the other has been already in a decaying state for the last twenty-four years.

Of course, the cause of the slower growth and longer life on Mount Lebanon is the different conditions of life in that locality. Loudon says: "When the tree has grown on mountains, the annual layers are much narrower, and the fibre much finer, than when grown on the plains; so much so, that a piece of Cedar wood brought from Mount Lebanon by Dr. Pariset in 1829, and which he had made into a small piece of furniture, presented a surface compact, agreeably veined and variously, and which, on the whole, may be considered handsome." It is scarcely necessary to say that the reason for this being the case in timber grown in the mountains, rather than in the plains, is the severer climate in the former. It might grow on the mountains until doomsday, without differing in the slightest degree from the trees in the plains, if the climate were the same in both. Trees, which in this country grow as slowly as those in Lebanon, will, doubtless, have to a certain extent the same properties as those of that country, but only to a certain extent, for they have not entirely the same conditions of life. They may have as much cold in winter, but they have not the heat of the Syrian sun in summer.

*Properties and Uses.*—The chief use of the Cedar in this country is planting for decoration; and it is usually said that it especially harmonises with buildings. Its stately port and horizontal tabular branches have apparently something architectural about them, and the conventional treatment of the tree by artists has given our minds a predisposition to associate it with masonry. We do not well see at first why this should be; but we know that the best associations of her products are those indicated by nature herself: and that the painter never produces so successful a result as when he extends the exactness of his imitation, not only to the special feature he copies, but to the proper association of the object he depicts. Those mingled together by nature herself are adapted the one to the other, and are always harmonious. When an inconsiderate painter introduces palms or other exotic foliage into a northern landscape, we feel the incongruity, and the effect is spoiled. It may be that this feeling is partly the result of education and mental association, as Yews and Cypresses are made the emblems of grief and the companions of grave-stones; but we imagine that it is not wholly so: there is a natural fitness of things which enables us to select the proper accompaniments of each tree; and, to give due effect to their character, the scenery of their native land should be studied, and its style selected, as far as possible, for the trees that we plant.

Fig. 31.

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* Mr. Thomas Moore, the curator of the Chelsea Botanic Garden, who has kindly supplied us with full details regarding the remaining tree, mentions that its height now is 60 feet, the trunk 13 feet 9 inches in girth at 3 feet from the ground, and the boughs spread out from the trunk as a centre 34 feet on the north side, $33\frac{1}{2}$ feet on the south, 29 on the west, and 27 on the east. The comparative shortness on the east side arises from their having been there in contact with the other tree which last fell.

If this is sound doctrine, there must be some reason why the Cedar is so generally accepted as the handmaid of architecture. Why do we recognise its introduction as beautiful, harmonious, and effective, in Martin's great pictures of the Hanging Gardens of Babylon, or of the Fall of Nineveh? where Cedar never grew, nor ever could grow. It is, we believe, because there is a certain degree of similarity between the scenery of its native mountains and the solemn architectural features introduced by that great artist.

Mr. Tristram, in his "Land of Israel," says of the scenery of Lebanon: "Nothing could be more lovely than the scenery. All mountain ranges seem to have a type of scenery peculiar to themselves—the Alps, the Pyrenees, the Dovrefjeld, have theirs; nor is that of the Lebanon inferior to others, consisting of a peculiar combination of grand precipices, with delicate cultivation." Our sketch of Hazar (fig. 31) illustrates this. Curiously enough, too, the very same character of scenery reappears in, or is prolonged into, the range of Anti-Taurus, also a habitat of the Cedar, as will be seen from the illustrations in Tchihatcheff's "Asie Mineure."

This character of the scenery of the homes of the Cedar is the very character of the architecture in the pictures, with which the Cedar seems to associate so grandly.

It may be that this is more fanciful than real; but at all events, the opinion is almost universal, that the Cedar harmonises well with man and his dwelling, his houses and his garden, and that it is especially adapted for an appanage to large and massive country mansions. Loudon, in his "Arboretum," quotes some very judicious remarks made by Mr. Thomson, an artist (*Gard. Mag.* i. 122), on the character of the buildings which best corresponds with it, condemning it as unsuitable for small villas, and commending it it as an accompaniment to stately architecture. This is true, but it is also true that it is an ornament and decoration to every place where it grows well, and where there is space to hold it.

A writer in the *Garden* (December 6, 1879), says that Mr. Marnock, the Curator of the Royal Botanic Gardens, told him that he had planted no fewer than twelve thousand Cedars of Lebanon in his various landscape gardening operations—that is to say, exclusively for ornamental purposes.

Loudon has ransacked the writings of antient authors for notices of the Cedar and the uses to which it has been put; but as the term Cedar was applied indiscriminately to the Cedar, the Cypress, and Juniper, and probably to other trees, the information thus obtained is somewhat uncertain.

Great durability has always been one of the chief characteristics ascribed to the Cedar.

The statue of Diana at Saguntum is a case in point, which was carved out of Cedar, which had formerly been brought from Zante by the inhabitants when they colonised Saguntum. Hannibal, it is said, found and preserved the statue after the siege of Saguntum, it having escaped destruction through being in the temple beyond the walls when the city was burned by the inhabitants.

Pliny speaks of a temple of Apollo at Utica in Africa, in which was found Cedar timber that, although nearly 2000 years old, was still quite sound.

The ceiling of the church of Helena at Bethlehem is reported by the late Dean Stanley, in his "Sinai and Palestine," p. 435 (1857), to be made of Cedar. This, however, is doubted by M. Salle, who considers it to be made of wood of larger dimensions than he thinks the Cedar can reach.

It is said to have been the timber that was used to fix the Elgin marbles into the temples from which they were removed: at least it was said so at the time they were brought over, although others have since thought it might be the Olive, which appears more probable.

Loudon questions its great durability. He says, "The wood of the Cedar is of a reddish white, light and spongy, easily worked, but very apt to shrink and warp, and by no means durable," and he quotes, apparently with approval, some objections taken by Varennes de Fenille to the Cedar of Lebanon having been the tree out of which the statue of Diana at Saguntum, formerly mentioned, had been formed. He cannot believe it to have been sculptured of so soft a wood, and one the grain of which was so unequal and subject to crack. But in our own times it has been applied with success to the same purpose, and therefore that objection will not hold. The late Dr. Lindley gave in the *Gardeners' Chronicle* (i. p. 733, 1840) a favourable account of its application to ornamental carved work. "Mr. Wilcox, of Warwick," he says, "a most ingenious and skilful carver (in his works little inferior to the celebrated Gibbons), has now in his rooms some specimens of furniture made of Cedar of Lebanon, ornamented with carved work in flowers, leaves, &c., in the best taste, and in sharpness and colour so similar to box-wood, that any common observer would mistake it to be such. It appears that it was by mere accident that Mr. Wilcox discovered the suitableness of the wood for this purpose. He got some of the wood through one of the many fine Cedars in the grounds of Warwick Castle having been blown down, when he tried his hand on it, and found it capable of being carved into the bold festoons of foliage above referred to, as well as into representations of birds, and even of insects; and it has this advantage, that it is perfectly secure from worms, from which most of the other soft woods, commonly used in carving, are so liable to suffer.

Another instance of its application to the same purpose is also mentioned in the same journal (i. p. 782, 1840). "In the old mansion-house, near Camberwell, on the London road, belonging to Sir E. Smyth, Bart., and now used as a school, there is a small room (I think called the Cedar Parlour) with a Cedar wainscot, round the upper part of which a wreath of fruit and flowers, and in one part a hawk with wings expanded, are carved of Cedar, with all his usual skill and delicacy, by the celebrated Grinling Gibbons himself:" but Dr. Lindley, in giving admission to the statement, qualifies it by the very just doubt whether the wood referred to can be the Cedar of Lebanon, because the tree was not introduced into England earlier than 1650, probably not earlier than 1680; at any rate it must have been very rare then; while Gibbons died in 1721.

Cedar parlours were probably never common; but they seem at least to have been a thing that would have been liked if the wood had been procurable. Those who have read Richardson will remember the Cedar parlour in Uncle Selby's house. A parlour is said to have been wainscoted with the timber of some of the Cedars at Whitton, which were raised from seed by the old Duke of Argyle in 1725; and at Cassiobury Park, near Watford, Herts, the seat of the Earl of Essex, "Cedar Cottage," erected for the steward of the estate, has its doors and principal woodwork made from the timber of some Cedars which were blown down on this estate in the year 1857. One Cedar parlour is spoken of as existing in an old house in Kent; but from the description of that wood it is certainly not the Cedar of Lebanon, being different in colour and smell, more like the Red Cedar (*Juniperus virginiana*) used by cabinet-makers for lining drawers and boxes. There is a coarse kind of Cypress common at Bermuda, often called Cedar, that is sometimes brought to this country. The book-cases in the Library at Abbotsford were made of this wood.

Dr. Pococke says: "The wood does not differ from white deal in appearance, nor does it seem to be harder. It has a fine smell, but is not so fragrant as the Juniper of America, which is commonly called Cedar." Varennes de Fenille, again, says that "the smell of the wood, so far from being fragrant, greatly resembles that of the Pine." The latter considers that it is the lightest of the resinous woods, contains very little resin, has a coarse grain, and that the wood is neither so strong nor so durable as it has the reputation of being; and says that we cannot suppose that the temples of Jerusalem and Ephesus were of the dimensions stated; or if they were, that the wood of the Cedar of Lebanon was used in their construction.

The only proofs that he or Loudon give is the statement that the wood "is very liable to warp and split in drying, on which account it does not hold nails well (a remark which was also made by Pliny), and that it is unfit for use except in large masses."

But while there is ample evidence of the sempiternal endurance of the Lebanon-grown Cedar, we are scarcely in a position as yet to give an opinion upon the English-grown timber.

There are no means by which extreme durability in it can yet be proved. The results of the trial of young and green wood, even if unfavourable, could have little bearing upon the subject, and it has not been long enough introduced to make a fair test of old wood possible. But there is no denying that the appearance of the timber is against it. It would seem to stand to reason that a soft, spongy wood cannot be very durable, and we presume we must allow that the wood of the English-grown Cedar sometimes is of that character. A table, which Sir Joseph Banks had made out of the Hillingdon Cedar, is said by Loudon to have been soft, without scent (except that of common deal), and possessed little variety of veining; and he mentions that the same remarks applied to a table which he had made from a plank from one of the trees of Whitton Park. The layers were distinctly marked, the softer or summer side of each being whitish, loose, and spongy, the harder or winter part being close-grained, and of a light-brown colour.

The strength of the timber in this country is also no indication of that in its native country. It seems unquestionable that in the latter it is much greater than in English-grown timber. The old branch which Sir Joseph Hooker brought from Lebanon gives a totally different idea of the hardness of Cedar wood from what English-grown specimens do; but as there is no prospect of the Lebanon timber ever becoming an article of commerce in our days, our practical concern with it is very much limited to the former.

Loudon tells us that the result of some experiments which he made on the strength of a plant from the large tree at Whitton, which was blown down in November 1836, was that he found it very inferior in point of strength to the common English-grown Scotch Pine. The colour and strain of the wood, he adds, were precisely the same as those of a specimen received by Mr. Lambert from Morocco—that is, of the *Cedrus atlantica*. We have in our account of the Deodar given the particulars of a comparative trial of the strength of that tree and the Cedar, from a specimen presented to the Royal Horticultural Society by Mr. Tillery, the gardener of the Duke of Portland, where the Deodar had been inarched or grafted on the Cedar, so that the lower part or stock furnished timber of the Cedar, and the upper part timber of the Deodar. A piece a foot in length and an inch square was taken from each, within a foot of the spot where the graft had been made, so that it furnished a portion of the timber of each, which not only had lived under the same climate, exposure, and other conditions of life, experienced the same degree of temperature at the same time, had bent to the same blasts, been frozen by the same cold, thawed by the same sunshine, and refreshed by the same showers; but were also of the same size and age, growing on the same root, and, of course, in the same soil. We could never, therefore, expect to have a fairer opportunity of testing the strength of the two timbers with entire impartiality, always supposing the climate to be equally suitable to both. On testing these the Cedar broke under a weight of 378 lbs., the Deodar under that of 448 lbs., which would make the latter about one-sixth stronger than the former. Figs. 32 and 33, drawn from these pieces of wood, shew the nature of the fracture of each. The tenacity of the Cedar (fig. 32), as indicated by its deflection under the weight which broke it, was still less than that of the Deodar (fig. 33). It would therefore appear that little can be said in favour either of the strength or tenacity of home-grown Cedar.

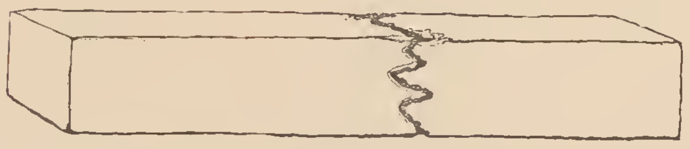

Fig. 32.—Breakage of Cedrus Libani.

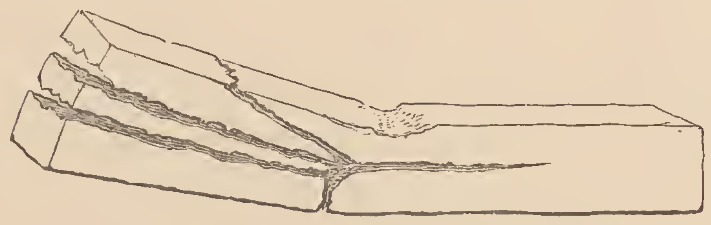

Fig. 33.—Breakage of Cedrus Deodara.

We are more disposed to accept its incorruptibility when not exposed to the weather, as also a modified degree of fragrance, and consequent power of resisting the attacks of insects.

The true explanation of the discrepancy between the received belief in the endurance of the timber taken from Lebanon, and the apparent aptitude to decay of that grown in England, is doubtless the difference in their rate of growth. It is not improbable that the difference in the longevity, the durability, as well as in the fragrance of the Lebanon and English trees, may be in proportion to their slowness of growth.

Loudon gives the actual weight of Cedar wood per cubic foot, as determined by Varennes de Fenille, Mussenbrack, and Hassenfratz, respectively at 29 lbs. 4 oz., 42 lbs. 14 oz., and 57 lbs.; but these results are obviously, from their disparity, arrived at by experiments on green wood, and are of course of no value. The real specific gravity is said to be 6.13.

The bark is available for tanning, and an analysis made by Professor Chevreuil makes its astringent properties in comparison with those of the Oak as 12.75 to 19.75, that is, as about 1 to 3. On this point we cannot speak from personal knowledge. We have, however, little doubt that the idea of the Cedar bark being suitable for tanning, originated in the supposition that the Cedar is most nearly allied to the Larch, the bark of which is applied to that purpose. But, as already explained, that the nearest ally to the Cedar is not the Larch, but the Silver Fir, we should consequently not expect its bark to have tanning properties in any greater degree than the Silver Fir. Probably all the *Abietinæ*, or, for that matter, all the Conifers, have a certain amount of astringency in their bark; while some of them, such as the Larch and the *Wellingtonia* (*Sequoia*), have it in a more remarkable degree than others.

The resin of the Cedar is not so abundant as that of many other Conifers. It besmirches the cones, and flows from wounds in the bark, but chiefly abounds in the seeds. Professor Chevreuil found 41 per cent. of resin in the seeds of the Cedar, while he got only 21 per cent. in those of *Pinus Cembra*, 24 per cent. in those of *P. Pinaster*, and 9½ per cent. in *P. Pinea;* but there is no common basis of comparison between the Cedar and these species. The seeds of all the Silver Firs overflow with odoriferous resin, while the seeds of Pines are as free from resin almost as nuts, which they resemble. The resin is put to no use in modern days, but in ancient times the Egyptians, who were far advanced in many of the arts, applied it to various purposes. According to Vitruvius, they used it as one of the ingredients for embalming their mummies; and they rubbed it over the leaves of Papyrus and other objects, to preserve them from the attacks of insects. The Romans adopted this prescription, or something analogous to it, which they called *Cedria*. The books of Numa, which were found uninjured in his tomb 500 years after that monarch's death, had been steeped in or rubbed with it to preserve them from insects. The details of the manufacture have not come down to us; but Dr. Hoffmeister gives the following account of the process as applied to the Deodar at the present day in Koonawur, in the Himmalayahs:—

> "Resinous Cedar wood (or the cones) cleft into many small pieces is carefully squeezed into a new round pot, in such a manner that nothing can fall out when the pot is whirled round and round. It is then turned upside down over a copper bowl set in a little pit, every opening being filled up with small stones and moss. Round about the pot a heap of billets of wood is piled up so high as entirely to cover it and kept burning for fully two hours. Next morning the little pot is opened, and the copper vessel removed, in which the cedar oil is found to have gathered in the shape of a thin liquid substance resembling tar. . . . It is used as a medicine internally and externally in cases of intestinal disease, and in eruptions of the skin."—Hoffmeister's "Travels in Ceylon and Continental India," 1848, p. 367.

We read in Pliny, Dioscorides, and Scribonius Largus, that it was used for curing the toothache. We may consequently be pretty sure that it was a preparation similar to creosote, whose antiseptic properties it seems to have possessed. There is nothing new under the sun.

M. Pomet gives the following account of the properties which the druggists of last century supposed it to possess:—

> "The Cedar of Lebanon is a tree which grows to a prodigious size, and of a pyramidal figure, whose branches are adorned with little narrow green leaves, and the fruit like our pine-apples. It is from the trunk and the large branches of this tree that there flows, during the great heats, without any incision, a sort of white resin, very clear and transparent, which we call *Cedar gum*, of which the largest trees yield not less than six ounces a-day. Here are likewise, during the hot season, little bladders made by the scorching of the sun, which, being pierced, afford a clear white liquor, like water, of a strong penetrating smell, and is of the turpentine kind; and when the tree ceases to produce any more of that, being cut, there flows an unctuous matter, which, drying as it runs down the tree, is what we call resin of Cedar, which is very rare in France, as well as the other productions of this tree. This resin is of a very fine yellow, bright and transparent, and of a very grateful odour.
>
> "The true oil of Cedar is admirable for curing tetters and scabs in horses, cattle, sheep, and other beasts; but as these sorts of oil are too dear, we will institute in their place clear oil of pitch, which upon that subject is called oil of Cedar, as you will find in the chapter on pitch."—Pomet "On Druggs" (English Translation, p. 66, 1712).

La Roque, in his "Voyage de Syrie et Mont Liban," already referred to, narrates the following peculiarity as one of the properties of the Cedar; and feeling that this property may be difficult of belief, brings

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brings testimony in support of it:—"The Maronites say that no sooner do the snows begin to fall than these Cedars, whose boughs are now all so equal in extent that they appear to have been shorn, never fail to change their figure. The branches, which before spread themselves, rise insensibly, gathering together, it may be said, and turn their points upwards towards heaven, forming altogether a pyramid. It is nature, they say, that inspires this movement, and makes them take a new shape, without which these trees could never sustain the immense weight of snow remaining for so long a time."* It is to this fabled (it is unnecessary to add wholly imaginary) property that Southey alludes in "Thalaba"—

> "It was a Cedar tree
> That woke him from the deadly drowsiness;
> Its broad round spreading branches, when they fell,
> The snow rose upward in a point to heaven,
> And, standing in their strength erect,
> Defied the baffled storm."

Lambert records, as a peculiarity of the Cedar, that if a branch of the Cedar is cut off, "the part remaining in the trunk gradually loosens itself, and assumes a round form resembling a potato; and if the bark covering it be struck smartly with a hammer, the knot leaps out." Loudon quotes the passage, adding, "This fact, Mr. Lambert states, was communicated to him by Sir Joseph Banks; but he adds that he had tried the experiment himself." If he had tried the experiment on an oak, or any other tree, he would have obtained the same results; indeed, the knot when ready leaps out under the mere influence of the growth of the tree and warm weather without being struck at all.

*Culture.*—Loudon says that in whatever soil or situation the Larch grows, there the Cedar will probably also thrive. This is not confirmed by the experience which we have had since he wrote. The Larch usually thrives throughout Scotland (the Larch disease is an exceptional complaint, the causes of which are not yet determined), but in many parts of it the Cedar does not thrive, or, we should say, does not grow so rapidly as it does in England. The climate, especially north of the Forth, has too little summer heat and too much winter cold, not for its existence, but for its rapid development. As regards the winter cold, it probably comes nearer the condition of its natural climate, and the slow-grown Scotch specimens, if we had patience to wait for them, may be nearer the Lebanon-grown trees in character as well as rate of growth than the English specimens.

Mr. Palmer's tables shew that, during the winter of 1860, out of sixty-one places in England it was uninjured at thirty-eight, slightly injured at thirteen, much injured at six, and killed at four; in Scotland, out of eighteen places, all escaped, except at seven, at one of which (Hamilton Palace) some old trees were killed; at the rest the injury done was not great; and in Ireland reports were had from only two places, and at both the trees were uninjured.

The worst injury done was at Hamilton Palace, and at Short Grove in Essex, at both of which it was old trees that suffered. At Short Grove there were six trees at the bottom of the park (the lowest ground) about 100 years old, from 40 to 60 feet high, and with stems from 9 to 12 feet in circumference; and five others about twenty years old, and from 12 to 15 feet high, all killed; and twenty-five trees about 100 years old, and from 50 to 60 feet high, so much injured, that recovery was impossible. Besides these there were in the pleasure-grounds, near the house, four trees about 100 years old, and from 50 to 60 feet high, which lost the ends of the branches, and were much injured, though not so severely as those in the low grounds; and on the highest ground there were sixteen trees about 100 years old, and from 50 to 60 feet high, which were slightly injured.

In some of the places in Mr. Palmer's tables where the trees are reported as injured, the young trees were left leafless and nearly killed, and the old trees much browned, and the shoots of two or three years old killed, and in many cases they afterwards lost large branches. In some cases the trees struggled through the winter of 1860–61, only to succumb to the much less severe one of 1863—their stamina having been too much injured by the former to sustain the feebler attack of the latter.

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* La Roque, op. cit. I. p. 93.

The Cedar seems not to stand the sea-breezes well. In Mr. Palmer's reports there are constant memoranda to that effect. Neither does it bear late spring frosts.

In addition to the ancient or renowned Cedars in Britain which we have already noticed, the following are worthy of being put on record. Our information, unfortunately, chiefly applies to their height, which is a less interesting point than girth of stem, as, after a certain height is reached, the trees increase little in altitude, and grow only to girth and spread of branches. A knowledge of the tallest trees, however, will be a sufficient indication that they have also reached larger dimensions in other respects, which may serve as fair illustrations of the size and rate of growth in different parts of the country. A few which are so noted are quoted from Loudon's "Arboretum," and there are some of these which we have not had the opportunity of remeasuring or verifying.

| County. | Place. | Height in Feet. | Supposed Age. | Girth. | | | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | | Feet. | Lines. | At height in ft. from Ground. | |
| ENGLAND AND WALES. | | | | | | | |
| Bedford | Woburn Abbey | 85 | 250? | ... | | ... | ... |
| Berks | Windsor Castle | 60 | 60 | ... | | ... | ... |
| Bucks | Hedsor | ... | ... | 9 | 0 | ... | Spread of branches 224 feet (Loudon). |
| Caermarthen | Golden Grove | 80 | 156 | ... | | ... | ... |
| Cambridge | Gamlingay | 60 | 112 | 11 | 3 | ... | ... |
| Cardigan | Hafod | 40 | 60—70 | ... | | ... | ... |
| Cornwall | Tchidy Park, Redruth | 25 | 50 | ... | | ... | ... |
| Denbigh | Coed Coch | 40 | 60 | ... | | ... | ... |
| Derby | Chatsworth | 90—100 | 80—100 | ... | | ... | ... |
| " | Eivaston | 90 | 80 | 16 | 7 | 2 | ... |
| " | Radbourne Hall | 60 | ... | ... | | ... | ... |
| Devon | Bicton | 70 | 35 | 16 | 0 | 3 | ... |
| Dorset | Milton Abbey | 50—60 | ... | ... | | ... | ... |
| " | Bryanston | 150 | 64 | 10 | 8 | 4 | ... |
| Gloucester | Farnham Barton | 50 | 50 | ... | | ... | ... |
| " | Doddington Park | ... | 80 | 25 | 6 | ... | Loudon (1837). |
| " | Frenchay, near Bristol | 90 | 150 | 18 | 0 | 2 | One of a noble group. |
| Hants | Grange Park | 92 | 100 | ... | | ... | Spread of branches, 200 feet. |
| Hertford | Aldenham Abbey, Watford | 60—70 | 63 | 9 | 11 | 3 | Measured 50 feet in 1837. |
| " | Bayfordbury | ... | 117 | 15 | 11 | 3 | One tree measures 62 feet of clear |
| Kent | Redleaf | 60 | 55 | 17 | 6 | 3 | ... [straight timber. |
| Lancaster | Holkar | 58 | ... | ... | | ... | ... |
| Lincoln | Sudbrooke Holme | 45—3 | 60 | 5 | 3 | ... | Loudon (1837.) |
| Middlesex | Syon House | 50 | ... | 24 | 0 | 3 | Spread of branches Loudon (1837). |
| " | " " | 77 | 80 | 16 | 6 | 3 | ... |
| " | Chiswick House | ... | 146 | 16 | 8 | 3 | ... |
| " | " " | ... | ... | 14 | 1 | 3 | ... |
| " | Enfield Palace | ... | ... | ... | | ... | Dr. Uvedale's tree. |
| " | Claremont | 100 | ... | 16 | 6 | ... | ... |
| " | Kenwood | 90 | 90 | 13 | 6 | ... | 120 feet spread of branches. |
| Montgomery | Powis Castle | 55 | 44 | 7 | 9 | 4 | 51 feet do. do. |
| Norfolk | Holkham | 50 | 70—80 | ... | | ... | ... |
| Northampton | Castle Ashby | 90 | 100 | 11 | 6 | 4 | ... |
| Northumberland | Alnwick Castle | 60 | ... | ... | | ... | ... |
| " | Belsay | 34 | 60 | 6 | 6 | 4 | ... |
| " | " | 32 | 25 | 4 | 3 | 4 | ... |
| Nottingham | Welbeck Abbey | 80 | ... | ... | | ... | ... |
| Oxford | Blenheim Park | ... | ... | 22 | 0 | ... | ... |
| Rutland | Belvoir Castle | 65 | 73 | ... | | ... | ... |
| Salop | Kinlet | 41 | 39 | 6 | 9 | 4 | In 1837 this was 27 feet high. 51 feet |
| " | Walcot | 63 | 64 | 11 | 0 | 4 | [spread of branches. |
| Stafford | King's Bromley Manor | 50 | 150 | ... | | ... | ... |
| Suffolk | Easton Park | 70 | 100 | ... | | ... | ... |
| Surrey | Randalls Park | 80 | ... | ... | | ... | ... |
| Sussex | Dale Park | 30 | 60 | 9 | 4 | 5 | Circumference of branches, 350 feet. |
| " | Goodwood Park | 92 | 112 | ... | | ... | One of them contains 300 cubic feet |
| Warwick | Warwick Castle | ... | ... | ... | | ... | ... [of timber. |
| Wilts | Longleat | 75, large & fine | 70, very old | 10 | 2 | ... | ... |
| Worcester | Standford Court | 75 | 117 | 19 | 2 | 4 | ... |
| " | Croome Court | 70 | 170 | ... | | ... | ... |
| York | Sprotbrough Hall | 42 | 48 | 7 | 6 | ... | 43 |

In Scotland there are not many good Cedars. The two old trees at Hopetoun House are said to have been brought by the Duke of Argyle in 1740, or, according to Dr. Walker, in 1748. They are nearly of equal dimensions, viz., 81 feet high in 1856, and 20 feet in girth at 3 feet from the ground, and 23 feet 9 inches at 6 feet from the ground. At Beil there is a specimen one hundred and forty years old. At Ratho there are some fine Cedars with trunks from 12 to 15 feet in girth. There is an old one of equal girth at Invergowrie. At Hamilton Palace, in Lanarkshire, there were some which in 1860 were eighty years old, and 40 feet high; but they were killed in that winter. At Carlowrie, in Linlithgowshire, there is a specimen sixty years old, and 35 feet in height. These dimensions shew the slower growth in Scotland. The following are the sizes and ages of some of the Cedars in Scotland:—

| County. | Place. | Height in Feet. | Supposed Age. | Girth. | | | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | | Feet. | Lines. | At height in ft. from Ground. | |
| East Lothian . . . | Beil . . . . . . . | 54·6 | 110 | 13 | 6 | ... | Spread of branches, 201 (Loudon). |
| Lanark . . . . | Hamilton Palace . . . | 40 | 80 | ... | | ... | ... |
| Linlithgow . . . | Carlowrie . . . . . | 35 | 60 | ... | | ... | ... |
| Midlothian . . . | Arniston . . . . . | ... | ... | 12 | 0 | ... | Spread of branches, 60 ft. in diameter. |
| „ . . . | Hopetoun House . . . | 81 | 118 | ... | | ... | ... |

We know of no Cedars of much age in Ireland, excepting those already referred to as having the reputation of being planted by Sir Walter Raleigh.

In France the Cedar thrives well; fine Cedars are common, although the tree is not grown so extensively as in England. It is not at all fastidious, growing on almost every description of soil, although clay or gravel seems to suit it better than sand or chalk. Loiseleur says that the oldest Cedar in France was introduced in 1734 by Bernard de Jussieu, who, on returning from his first visit to England, brought with him two young Cedar plants, so small, that to preserve them more securely, he is said to have carried them in the crown of his hat.* One of them was placed on the mount in the Jardin des Plantes, where it still is. It appears that the other young plant, after being long lost sight of, was discovered by M. Merat, in 1832, at the Chateau de Montigny, near Montereau, a little town about eighteen leagues from Paris. The Cedar at this place, although planted at the same time as that in the Jardin des Plantes, had, when last reported on, its trunk at least one-third larger than it; a circumstance due to its having been planted in good soil, instead of being planted, as the other was, on a heap of rubbish, and injured by an accumulation of soil being heaped about its roots. M. Henri Vilmorin, of the well-known house of Vilmorin-Andrieux, & Cie., seedsmen in Paris, who has kindly assisted us in procuring information regarding the growth of the Cedar on the Continent, tells us that the finest example in France which he has heard of, is at Montigny Lencoup, near Provins. It is little more than a hundred years old, and in 1827 was already 14 feet in girth at 3 feet above the ground, and is now (1883) exactly 28 feet 4 inches in girth at 5 feet above the soil.

M. Loiseleur-Deslongchamps mentions that the greatest planter of Cedars in France that he knew of was the Viscount Héricart de Thury, who, in 1780, planted many trees on the mountain of St. Martin le Pauvre, Departement de l'Oise.

The same author also speaks of having seen in 1835 a remarkably fine pyramidal Cedar on the estate of the celebrated Duhamel du Monceau, with a stem 70 or 80 feet in height, giving out horizontal branches all the way up, and 12 feet 8½ inches in girth at a man's height from the ground, and 16 feet at the ground. He also notices two other handsome trees at Vrigny, although not so fine as the first: one of these, a few years ago, was 72 feet high, and 18 feet 9 inches in circumference at 3 feet above the ground. It very soon branches off in four or five big boughs, which form a very broad head, exceeding 80 feet in diameter. Besides these, the following have been recorded as noteworthy, viz., a Cedar which is in the old garden of the Maréchal de Noailles at St. Germain; one in the Marbeuf Garden in the Champs-Elysées; and some in that of the Trianon at Versailles, which were all 8 or 10 feet in girth at the height of a man; and one in M. Leroux's park at Franconville, seven leagues to the north of Paris, which is now spoken of as an especially fine example, which was seventy years old (in 1835) and 12 feet 3 inches in girth at the base of the trunk.

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* There is a romantic story (the germ of which is no doubt to be traced in the fact set forth above) in regard to this introduction of the Cedar into France—a story which is worth placing on record as an instance of the firm hold which plausible tales have on the popular mind. The story runs that "Bernard de Jussieu, the celebrated botanist, when travelling in the Holy Land, brought away with him from among the Cedars of Mount Lebanon a little seedling. Being unprovided with better means of conveyance, he made a flowerpot of his hat, and planted it in it. He got it safely on board the vessel in which he sailed for France, but tempestuous weather and contrary winds drove the ship out of her course, and prolonged the voyage so much that the water began to fail. All on board were placed on short allowance; the crew, having to work, were allowed one glassful of water in the day; the passengers, not having to work, only half a glassful. It was a hard struggle for Jussieu to refrain from drinking the whole of his small daily allowance, and to leave some for the plant, and probably no one but a naturalist would have dreamed of such an act of self-privation. But his enthusiasm sustained him. All through the lengthened voyage, under the bright sun of the Mediterranean, he shared his half-glassful of water with his little plant. His own strength began to sink under the prolonged privation; but he never flinched, and arrived at Marseilles with his own health damaged, but with that of his little plant uninjured. On landing, the exhausted botanist had nearly lost the whole of the benefit of his self-denial from the incredulity of the custom-house officers, who could not understand or believe in the interest he professed to take in the plant, and insisted on emptying the strange pot, to see if there were no 'undeclared' lace, jewels, or prohibited articles buried beneath the roots of the seedling. Entreaties and eloquent appeals to his past sufferings on its behalf at last softened their hearts, and he was allowed to carry off the relic of the Cedars of Lebanon undisturbed. He brought it to Paris, and planted it in the Jardin des Plantes, there to become the feature of historical interest which now it is." The narrator does not leave the Cedar plant there, for after endowing it with a not wholly fabulous popularity, he clears the plant away to make room for a railway which does not exist!

This tale first appeared (so far as we know) in *Sharpe's London Magazine.* It was then repeated in the *Gardeners' Chronicle* (vii., p. 751, 1847); was disinterred and reproduced in an article in the *Edinburgh Review* (Oct. 1864); and afterwards referred to by Daubeny in his "Trees and Shrubs of the Ancients" (p. 34, 1865).

M. Vilmorin gives the dimensions of a young tree, planted by his grandfather (about 1816), in his country place, Verrières, near Paris. In 1856, it was 60 feet high, and 6 feet 10 inches in girth at 3 feet above the ground. In 1866 it was 81 feet high, and 8 feet 10 inches in girth at the same height, and at this present date (1883) it is 84 feet high and 11 feet 1 inch in girth at 3 feet 4 inches above the soil. It has ceased for several years growing in height. The soil is good loam.

Loudon speaks of a tree in the park at Fromont, near Paris, thirty-two years planted, 58 feet high, with the trunk 1 feet and the head 36 feet in diameter. M. Henri Vilmorin informs us that this park, which was laid out and planted by Soulange Bodin, contains several fine Cedars of various shapes, some being upwards of 80 feet high, and one more than 12 feet in girth at 3 feet from the ground.

Loudon also specifies one at Nantes, in the nursery of M. Nerrieres, forty years old in 1857, and 50 feet high, with a trunk 12 feet in girth; one at Fremont, then thirty-two years, and one at Barres, twenty-eight years old, and one or two other younger specimens.

Loiseleur-Deslongchamps mentions two Cedars planted in the plain of Beaulieu, near Geneva, of which the largest was in 1823, and at the age of eighty years, (according to M. Micheli de Chateauvieux,) 8 feet 5 inches in circumference at 4 feet from the ground. These may probably be a portion of the trees mentioned by Professor de Candolle as dropping seeds, the young plants from which seem disposed to naturalize themselves.

Prof. Karl Koch of Berlin states that the Cedar is killed throughout the north of Germany as far as the mountains of Thuringia (Thüringer Wald), even when it is well covered up during the winter: consequently they are only to be seen there in pots. It is not so much cold which kills it, as the changes of climate in the first weeks of spring when the plant begins to shoot, and bad weather suddenly comes, and sometimes several degrees of cold. On this side of the Rhine the Cedar prospers in some localities, even near Aix-la-Chapelle, while, on the contrary, it is very generally killed at Frankfort-sur-Mein. There are some large trees near Hombourg, not far from Frankfort, planted during the last century, but when some of these have died, and the attempt has been made to replace them with new ones, it appears that now they have been unable to resist the severity of the climate, and every attempt has failed. The Deodar suffers less, and at Berlin they had specimens which stood the cold for several years, but unhappily they succumbed during an unfavourable winter.

We cannot hear of any specimens in Austria, whence we conclude that the same fate attends it there as in more northern Germany.

It may be supposed, that although this is the usual result in Germany, there may be some more favourably situated spots where the Cedar will still thrive; for among the foreign specimens recorded by Loudon and some French authors, was one at Worlitz, in Saxony, which had been sixteen years planted, and was 25 feet high when he wrote. On inquiring after it, however, we learn that Worlitz is no exception to the general rule throughout Germany, and that the trees (for there were more than one, and Loudon must have been speaking from old information) at Worlitz were all dead by the time Loudon's pages appeared. M. G. L. Schoch, of Worlitz, reports that there were six Cedars in the ducal gardens, and that they were considerably older than stated by Loudon, having been planted between 1780 and 1790.

These were made to stand the climate only by means of covers made of branches, and fastened round the trees and above them. In the year 1830 they were about 40 feet high, and sheltering had become extremely difficult and expensive. In 1836 or 1837, owing either to the usual precautions having been neglected, or to the winter having been unusually severe, all six trees were frozen, dried up, and died.

In Denmark, Prof. Orsted tells us that it is only by great care and skill that the tree can be kept alive.

We have never yet met with or heard of any specimens in Holland, nor do we recollect of any in Belgium, although, as it grows at Aix-la-Chapelle, it will doubtless also live in that country.

Messrs. Henkell and Hochstetter state that a stately Cedar, about 60 feet high, is growing at Bollweiler in Elsass, in the garden of Baumann & Son, which Joseph Baumann, the founder of that gardening house, planted in the year 1734.* But there must be some mistake as to this tree, or else it must be no longer in existence, and another must hold its place; for M. A. K. Baumann replies to the inquiries of M. Vilmorin about it, that the tree now in existence at Bollweiler was planted in 1804 by his father, Joseph Baumann, who had received it from André Thouin, director of the Jardin des Plantes at Paris. The tree very soon lost its leader, in consequence of which the stem, which is now 2 feet 8 inches in diameter, branches off at 16 or 17 feet from the ground. It is nevertheless a fine tree, which has borne cones for several years past, but almost no growing seeds.

Many other fine specimens of *Cedrus Libani* are to be found in Elsass, chiefly in the neighbourhood of Strasburgh.

The tree is common, and thrives well in many parts of Northern Italy. Loudon notes one at Monza "twenty-four years planted, 24 feet high, and the diameter of the trunk 16 inches, and of the head 24 feet." It still survives, a large but not very high tree. Other good trees may be seen in Turin and at Masse, near Caluso.

We do not know whether it has been introduced into Spain. The Atlas species might easily be brought into, and would doubtless thrive in the mountains of Andalusia.

Professor Asa Gray and Mr. Meehan, two of the best American authorities, inform us that young plants exist in the United States of America; but old or fine specimens are not to be met with, as they had never seen specimens in America above a dozen feet in height.

It has been observed in France, and the same remark applies also to Britain, that although the Cedar is a mountain tree, the finest specimens are to be found only in plains and valleys, or on the declivity of hills of moderate height. M. Vilmorin remarks that some Cedars which he has observed, and which stand in lofty and exposed situations, are injured by frost almost every year, and lose a part of their foliage, so as to have some branches quite bare, like those of a Larch. New leaves are produced during the spring and summer, but the trees look always in very poor condition. They bear no cones, although more than fifty years old, and the male catkins are very small. The reason of this doubtless is, that although the Cedar is a mountain tree, it has already in France received the equivalent of elevation in the more northern latitude. To give it in France the same elevation that it has in Syria, would be practically to give conditions equivalent to double its elevation in Syria.

With regard to the placing or disposal of Cedars when planting them, one thing to be remembered is, that it is throwing them away to form close clumps or ordinary plantations of them. So planted, they have no more effect than Larch or any other Fir. They get drawn up, and lose their characteristic habit. To give them fair play, and turn them to the best advantage, they should be planted sufficiently wide apart to attain their full growth without interruption. It is a tree which, to come to perfection, must have plenty of air and space. One most effective distribution is that of single trees on a lawn, or in an open park. Another is a wide avenue with the trees not too near each other. An example of the fine

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* Henkell & Hochstetter, Synops d. Nadelhozer, 1865, p. 144.

effects

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effects of such an avenue, even in its early stage, may be seen at Dropmore, where one not much more than forty years of age is composed of trees already upwards of 36 feet in height. Another striking example of the effect produced by the Cedar, and of the beautiful forms which it assumes when left to itself, may also be seen in the trees on the margin of the lake at Elvaston Castle, an engraving of which appears in the *Gardeners' Chronicle* of 27th July 1878.

It does not seem to be particular as to the geological formations on which it grows. It thrives on the chalk and oolite, as does the Deodar, but does not affect them more than any other formation.

It has the advantage of being very free from insect enemies, and rabbits do not care for it.

Like other Conifers, the Cedar cannot bear pruning, as is well illustrated by the evil effects narrated by Miller to have followed the cutting-in of the lower branches of two of the Chelsea trees, to give light to an orangery.

It seems also to be subject to few diseases. Almost the only one which it has been said to be peculiarly liable to, is the attack of root-fungi. The Rev. M. J. Berkeley (*Gardeners' Chronicle*, 12th Jan. 1867, p. 26) has recorded instances of death of Deodars, Cypresses, Scotch Firs, &c., from this cause; and the Earl of Shannon corroborates his statements from his own experience in the south of Ireland. He says:—

> "I have within the past thirty years planted large tracts of land, much of which had been previously occupied by trees. In all varieties of soil, whether on limestone, or red sandstone, or clay, or dry or wet land, I find the same tendency. But what is mysterious to me, is that the disease seems to attack only particular varieties. I find the Scotch Fir, the Cedar, and occasionally, but very rarely, the Silver Fir, suffer. I have never yet succeeded in detecting a death of the Spruce Fir, nor of any of the hard-wood trees, such as Oak, Ash, Elm, and so forth. Shrubs also appear to escape entirely. It seems to be wholly confined to the Pinus tribe (as I find *Pinus insignis* to suffer severely), and to the Cedars of all sorts, and Larch. I cannot assign any reason why the Fungus should attach more to these kinds than to others. The result of my own observation is, that the mischief invariably arises from the roots of former trees being decayed, and I find that it is always worst where the previous plantations have been old and decaying, than where the trees were young and vigorous. I rarely see it on land not previously planted, and where it does exist, I suspect it to have come on the roots of the newly-planted trees. I remark, too, that I seldom or never observe it to arise from the roots of a growing tree, cut down to make room for younger plants."—"(*Gardeners' Chronicle*," 24th Jan. 1867, p. 78.)

In propagating the seeds they should not be taken out of their cones until they are to be sown. In the cones they will keep for five or six years. If they have been taken out, however, they will not sustain much damage if they are kept in a dry airy place.

M. Loiseleur-Deslongchamps gives full instructions for extracting the seeds from the cones, when pulled before they begin to open voluntarily—such as splitting up the axes with an iron spike, drilling a hole through the middle, and such contrivances. The simplest and easiest mode of opening them, as well as the cones of all other Pines which are close, is to steep them in water over night, and lay them before the fire the next day, taking the precaution, however, not to steep and open them until they are ready to be sown.

The seed should be sown about the middle of February in common loam, and covered with dry soil about half an inch deep. If the soil is sandy, it should be pressed down firmly on the seeds after sowing, and no water should be given until they come up, and for a short time after. If the ground seems dry, rather shade it than water. It is when the root first begins to perform its functions that caution should be specially used in giving water. It is of less importance while the young plant can still depend upon the nourishment supplied by the seed; but when it solely depends on the young root, water in place of nourishment is absorbed by the root, and the plant becomes weak and damps off. The best soil for the Cedar is a light loam. It grafts and inarches readily on the Larch and Deodar, and also, it is said, on the Silver and Spruce Firs; but we have no proof of this latter statement.

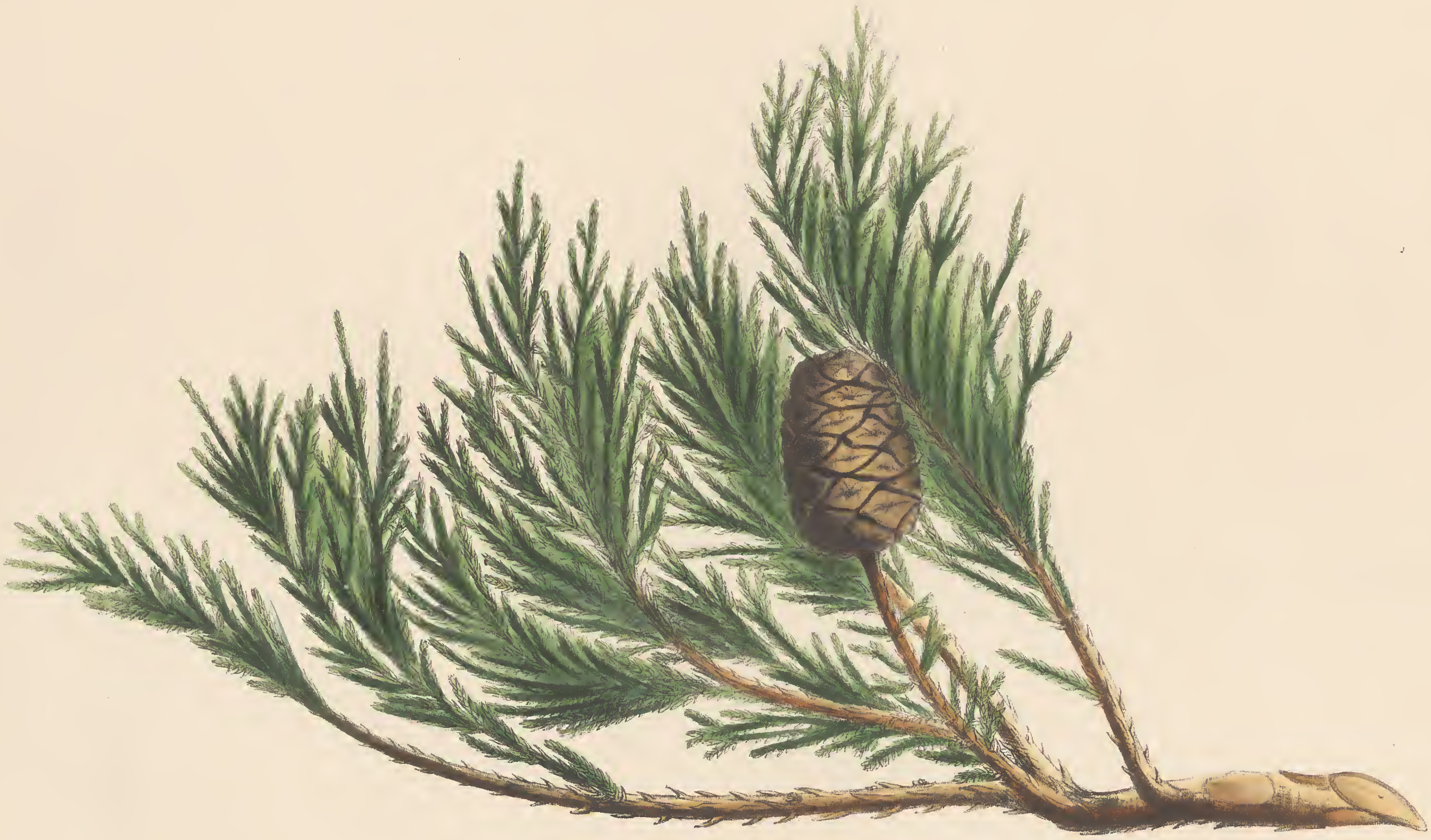
The Cedar shews considerable variety, not only in the habit of the tree, but also in the colour and character of its foliage. These have been noted by horticulturists, and have received designations corresponding to their peculiar character. There is a dwarf variety known as *Cedrus Libani nana;* a silvery blue variety named *Cedrus Libani glauca;* a pyramidal variety, *Cedrus Libani pyramidalis;* a weeping variety, *Cedrus Libani pendula*, and so on. In regard to the latter variety, Mr. Latimer Clark (*Garden*, June 28, 1879) says :—

> "For the past twenty years I have admired an exquisite specimen of the True Weeping Cedar of Lebanon, which stands in the grounds of the house called 'Menival,' the second house on entering the village of Dulwich from the London end. The tree is quite visible from the road, and its gracefully pendent branches flow over one another, and roll out in waves upon the grass in a manner that reminds one of the Falls of Niagara; and leads one to think, while looking at it, that it is the most beautiful of all Conifers. The tree looks about 30 feet high, and is probably eighty years old, and bears cones freely. The only other specimen I have seen is visible over a wall by the river's side in the village of Sunbury, and appears of a similar age. I have for years sought for this Weeping Cedar in vain in the nurserymen's catalogues, and presume it must be out of cultivation."

These horticultural varieties are not propagated so much by cuttings and grafts, although this is done in some of them, as by pricking out from the beds of seedlings the individuals which give promise of possessing each peculiar character. A considerable proportion of every sowing possesses marks of such individuality.

*Commercial Statistics.*—Sir John Cullum, who has already been quoted, in speaking of the large Cedar which had fallen at Hendon Place, incidentally mentions (Feb. 1779) that "the gardener made £50 of the cones the year before last, but last year only £12." From a memorandum left by Mr. Collinson, in his copy of Miller's "Dictionary of Gardening," it appears that, in 1761, he paid John Clarke, a butcher at Barnes, who was famous for raising Cedars from the seed of the Hendon tree, £79, 6s. for 1000 Cedars five years old, for the Duke of Richmond, which were all, as well as another large portion subsequently obtained, planted at Goodwood. In 1835, 139 of these still remained there. The Mr. Collinson here mentioned was a London tradesman (a linen-draper) and Quaker, well known to horticulturists, having been one of the chief encouragers of gardening about the middle of the eighteenth century, and was in intimate relations with most of the men of science of his time. He had a country house, first at Peckham, and afterwards at Hendon, about eight miles from London. He was born in 1693, and died in 1768. The same horticulturist has preserved us the means of knowing the price of young Cedars in his day. The following notice in the *Gentleman's Magazine* shews that in 1768 it was half a guinea each: "There is a Cedar tree at Mr. Osgood Hanbury's, near Coggeshall, in Essex, which is of interest, as it was planted by Mr. Collinson's own hand [query, direction] sixty-seven years since, in 1768. We transcribe the memorandum on the subject, very kindly sent us by Mr. Hanbury: 'In token of the love and perpetual friendship which has for so many years subsisted between myself and my dear friend John Hanbury and his family, and as a lasting memorial of that friendship, I desire that one guinea may be given to my sincere friend Osgood Hanbury to purchase of Gordon two Cedars of Lebanon, to be planted in two places of the new part of the park last taken in. Let the occasion of the said Cedars and of their ages be registered in the great Bible at Coggeshall, that succeeding generations may know our friendship and the antiquity of the trees. To my worthy friend Osgood Hanbury and his son I recommend their care and protection.—P. COLLINSON'" (*Gentleman's Mag.*, 1835. New ser., vol. iv. p. 579.)

Price of cones in 1838, 6d. each selected, or 10s. per 100; plants in pots, 1 ft. high, 2s. 6d.; 2 ft., 3s. 6d.; 5 ft., 5s.; 10 ft., 20s. each. In 1851 the prices are quoted generally in the nurserymen's catalogues as follows: one-year seedling, 3s., and two-years 5s. per doz.; plants 4 to 6 inches high, 9s., and 9 to 12 inches, 12s. per dozen; 15 to 18 inches, 2s. 6d.; 2 ft., 3s. 6d.; and 3 to 4 ft., 5s. each. Seed, 10s. per lb. These prices have varied very little from 1851 to the present date (1883), and may therefore be quoted as the current market value.



SEQUOIA WELLINGTONIA.

# SEQUOIA WELLINGTONIA.

Mammoth Tree of the Californian Settlers. Wa-wo-nah (Great Tree) of the Aborigines.

Identification.—WELLINGTONIA GIGANTEA, Lindley, in *Gardeners' Chronicle*, No. 52, pp. 820 and 823 (Dec. 1853), and scattered notices in succeeding years; Hooker, *Bot. Mag.*, lxxx., or Third Series, Nos. 4777 and 4778 (1854); Ch. Lem. *Illustr.*, p. 14 (1854); *Bul. Soc. Bot. de France*, i. p. 72 (1854); *Revue Hort.*, p. 116 (1854); *Flor. Cab.*, p. 121 (1854); Van Houtte, in *Flore des Serres*, ix. pp. 93 and 903 (1853-4); Carrière, *Traité Gén. des Conif.*, p. 166 (1855); Gordon, *Pinetum*, p. 333 (1858); and *Supplement*, p. 106 (1862); Murray, in *Edin. New Phil. Journ.* (New Series), xi. p. 205 (April 1860).

SEQUOIA WELLINGTONIA, *Bonplandia*, ii. p. 238 (1854); iii. p. 27 in adnot. (1855); vi. p. 343 (1858); Seeman, in *Annals Mag. Nat. Hist.*, Third Series, p. 161 (March 1859).

WASHINGTONIA CALIFORNICA, Winslow, in *California Farmer* for 1854; Hooker, *Journ. Bot.* and *Kew Miscel.*, vii. p. 29 (1855).

TAXODIUM WASHINGTONIANUM, Winslow, in *California Farmer* (*loc. cit.*); Hooker, *Journ. Bot.*, (*loc. cit.*)

SEQUOIA GIGANTEA, Torrey, in *Sill. Jour.*, Second Series, 18, p. 150 (1854); 20, p. 281 (1855); Decaisne, in *Bul. Soc. Bot. de France*, i. No. 2, p. 72 (1854); Torrey, in *Report on Botany* of Whipple's *Expedition*, in *U. S. Pacific Railroad Explor.*, iv. p. 140 (1857); Bigelow's *Description of Forest Trees*, in Whipple's *Expedition*, in *U. S. Pacific Railroad Explor.*, iv. p. 22 (1857); Blake, in *Proc. Calif. Acad. Nat. Soc.*, vol. ii. p. 201 (1863).

Engravings.—Tree, &c.—Veitch, Lithographic Plate, large folio, 1854; Hooker, *Bot. Mag.* (*loc. cit.*); Ch. Lem. *Illustr.* (*loc. cit.*); *Flor. Cab.* (*loc. cit.*); *Flore des Serres*, pl. 893 (*loc. cit.*); Murray, in *Edin. New Phil. Journ.* (*loc. cit.*)

*Specific Characters.*—S. vasta tri vel quadri-centipedalia; foliis alternis triangulatis coriaceis erectis imbricatis spiraliter positis; floribus masculis subglobosis pedunculatis; strobilis oblongo-ovatis ligneis, squamis cuneatis truncatis per apophysin transverse sulcatis mucrone setacea in medio. Seminibus 3-7 cuique squama supra medium pendulis compressis utrinque alatis.

Habitat in California in montibus Sierra Nevada, prope origines fluminum Stanislaus ex San Antonio, in lat. 36° ad 38° N., long. 129° 10′ W. Altitudine ped. 5000.

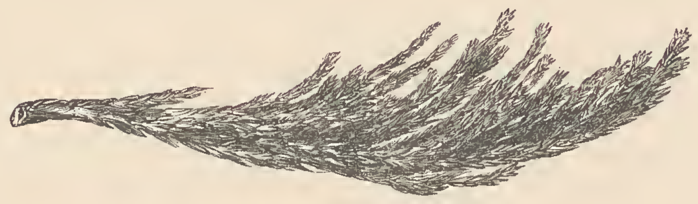


Fig. 1.

A tree reaching from 200 to 400 feet in height, and 30 feet in diameter; wood extremely light and fragile; bark, externally of a pale cinnamon brown colour, internally darker in colour, very thick (in mature trees 15 inches or more), tough, stringy, corrugated, with the interstices filled with a spongy and elastic padding. Branchlets, with the leaves sometimes slightly distichously pinnated, more usually with them quadrangular, especially in young plants, only loosely adpressed [fig. 1]; in the older form they are closely imbricated, and hence the twig looks thinner. Leaves applied to the branch, thick, roundish on the outer side, scarcely concave on the inner side; those on the stem of the branchlets elongate [figs. 2 and 3]; on the twigs much shorter [fig. 4], small, pale green when young, dark green when older, arranged on an elongate spiral, imbricated, oblong-subulate, apiculate, or mucronate; semiamplexicaul at the base, keeled at the back, flat within, but with a slightly elevated central ridge: those of the older branches smaller, shorter, more compact, and crowded, ovato-lanceolate, acute. There is no gland at the back of the leaf as in the Cypress; but along each side are a number of stomata irregularly scattered.

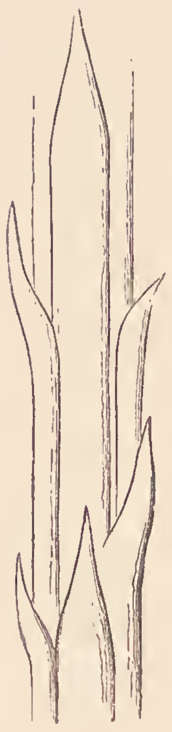


Fig. 2.

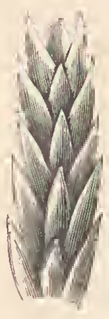


Fig. 3.

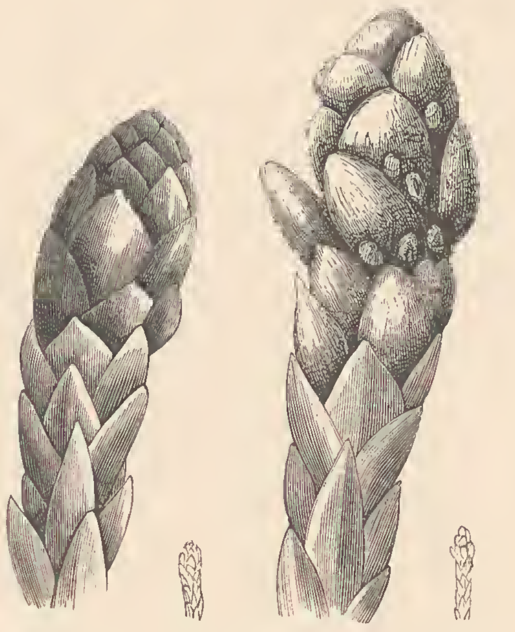


Fig. 5. Fig. 4*a*. Fig. 6. Fig. 4*b*.
Male Catkins.

Male catkins [figs. 4*a* and 4*b* natural size, and 5 and 6 magnified], in structure the same as those of *Sequoia sempervirens*, but smaller and narrower, pedunculated, subglobose, single, at the extremity of the branchlets; the peduncle slight, placed in the centre of a sort of involucre composed of peltate scales spirally arranged, the inner of which are largest, and have a membraneous margin: stamens pedicellate, and the anthers, three or four in number, globose, sessile, and borne on the inner lower margin of the scale [figs. 7, 8, and 9]. The microscopic structure of the scale is seen in fig. 10, which shews that it is petaloid, adding probability to the idea that the scale is the perianth of the male flower. The pollen is variable in shape [figs. 11, 12, 13, and 14]. The scales are larger than those of *Sequoia sempervirens*, and less jagged on the margins; the stamens smaller. The scale of the female flower is at first similar to the male scale, but rapidly increases in size, and assumes the form shewn in figs. 15, 16, 17, and 18.

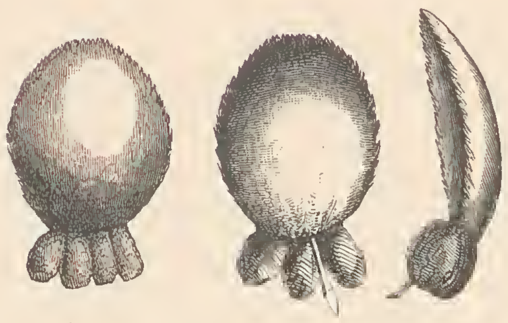


Fig. 7. Fig. 8. Fig. 9.
Male Flowers.

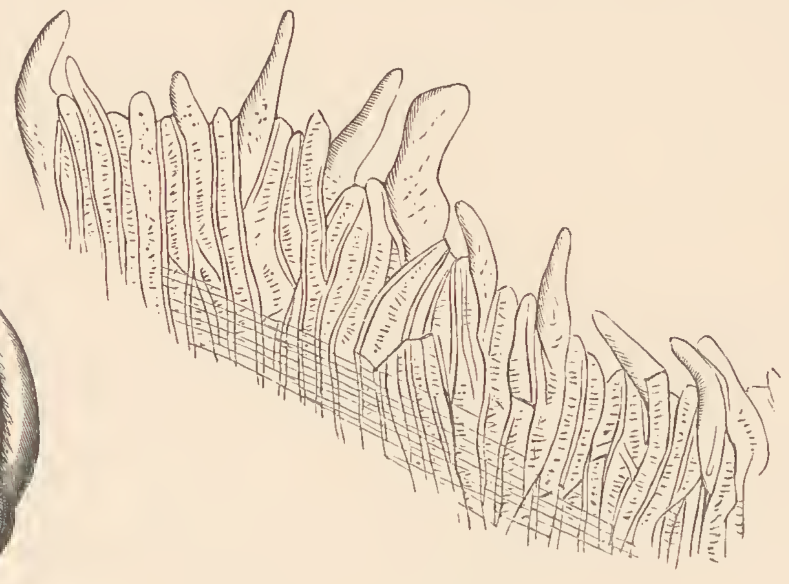


Fig. 10.
Microscopic Structure of Male Scale.

A claret-coloured exudation forms between the scales, simulating a membrane. Cones, from one to two inches long by one and three-quarter inches in diameter at the widest part [fig. 19], ovate, obtuse, ligneous, composed of a central axis of a stoutish ovato-cylindrical form, bearing a number of rather large, thick, spreading, stipitate ligneous scales, growing like branches out of the axis. Fig. 15 represents the young cone magnified, and figs. 16 and 17 the outer and inner side of the scale, and fig. 18 a side view. The cone at a more advanced age is shewn in fig. 19, and the outer, inner, and side view of its scale in figs. 20, 21, and 22.

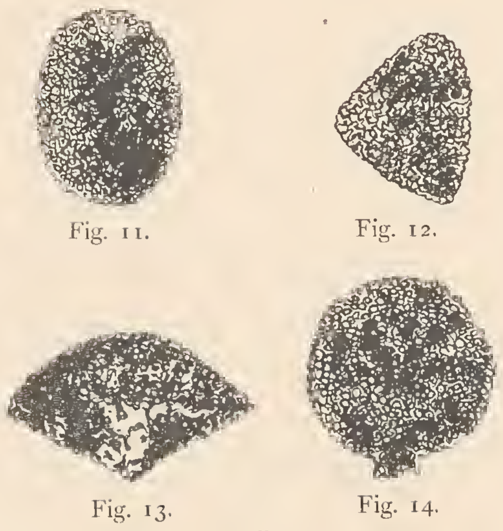


Fig. 11. Fig. 12.
Fig. 13. Fig. 14.
Pollen.

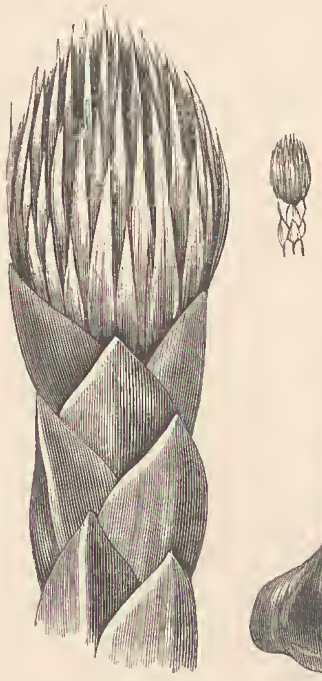


Fig. 15.
Female Flower.

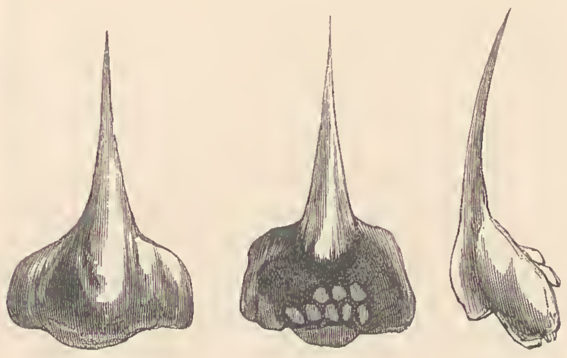


Fig. 16. Fig. 17. Fig. 18.
Scales of Young Cone.

The cone is thick, and its core is a continuation of the solid wood of the axis of the tree, as shewn in fig. 23, which is copied from a section of the entire cone. Fig. 24 shews the skeleton core of a single scale at that stage. The apex of the scale is dilated, convex, wrinkled, transversely rhomboidal, with a transverse elevated ridge or keel, and in the middle a depression, from the centre of which springs a setaceous umbo. Beneath each scale are lodged a variable number of seeds (from 3 to 7), flat, compressed, circular, about a line in length, surrounded by pergaminous wings, which are widest on the sides. The seed is represented in fig. 25*a*; 25*b* is a side view of it. They are arranged in rows, some lying over the others, as shewn in figs. 21 and 22; and attached, not at the base but towards the top, by the margin of the wing, in the same way as they are in the Dammara, and in *Cunninghamia sinensis*, and *Sciadopitys verticillata*. Cotyledons, germinal leaves, 3 to 7, generally 4 [fig. 26*a* and 26*b*], thick, rounded above, somewhat glaucous, almost flat, reddish below, the colour blending with that of the bark. The primordial leaves linear, alternate, subcylindric, glaucescent, and terminated by a small mucronated point. The young plants, on pushing their way out of the earth, have their young bark of brick red or violaceous colour, which they preserve for the first year.

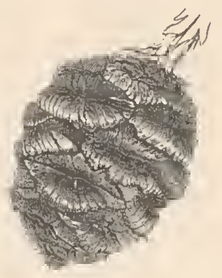


Fig. 19.
Cone.

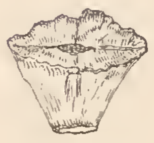


Fig. 20.

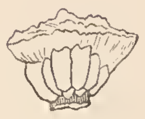


Fig. 21.
Scale of mature Cone.

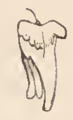


Fig. 22.

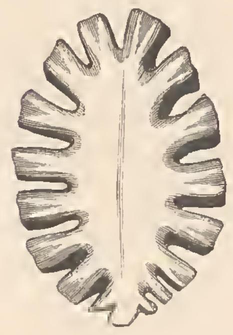


Fig. 23.
Section of Cone.

Dr Bigelow (*loc. cit.*) says, "I observed a remarkable peculiarity with regard to their fruit cones; namely, that they were in every state of development, from the germ to the ripe fruit. I was near them about the middle of May, when the ground was literally covered with their cones and seeds." Mr Clark (who appears to be a resident in the valley of the south fork of the Merced River, not far from the Mariposa Grove, and who is said by Mr Blake (*loc. cit.*) to be very familiar with the trees, and to have collected their seeds) observed that the cones require two years to mature or yield seeds that will germinate; and we find the same to be the case in this country.

Fig. 24.
Core of Scale.

Fig. 25*a*.

Fig. 25*b*.

The proper designation of this tree has given rise to much discussion. It was first described by Dr Lindley; and the name given by him (*Wellingtonia gigantea*) should, by the rules of priority, if there were no intrinsic objections to it, have precedence over all others. Objections, however, have been taken to it, both on scientific and general grounds.

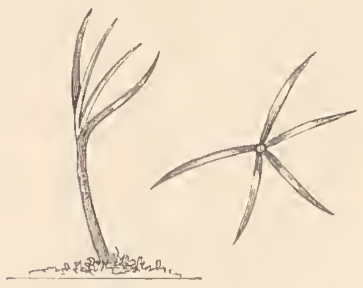


Fig. 26*a*. Fig. 26*b*.
Germinal Leaves.

On the former, exception has been taken to the generic denomination, first by Professor Asa Gray, and Professor Decaisne, and latterly by most botanists, that the tree is only a second species of *Sequoia*, and, consequently, that a new generic name (*Wellingtonia*) was uncalled for.

The following were the reasons given by Dr Lindley, in his original description of the tree ("Gardeners' Chronicle," 1853, p. 823), for separating it as a genus from *Sequoia*.

> "Let us now," says he, "endeavour to shew upon what technical grounds we conceive that the genus *Wellingtonia* is satisfactorily established. *Wellingtonia* is a tree with the imbricated scale-like leaves of some Junipers attached to the branch by a broad base; and when, as happens in the more vigorous shoots, the leaves acquire unusual development, they still are sessile bodies, with a triangular section, and no tendency whatever to form a flat lamina. But they are alternate, not opposite." [No, only so on a cursory inspection; they are in reality disposed spirally]. "In *Sequoia* and *Sciadopitys*, genera also having alternate leaves" [some misapprehension here—*Sciadopitys* has them verticillate; and in *Sequoia*, although generally distichously spread out like those of the Silver Firs, they are in reality spirally disposed too], "the leaves acquire the expansion of a *Taxus* or a *Podocarp*.
>
> "The cones are like those of *Sciadopitys* in size and form; but the bracts, instead of being half-free, are so completely consolidated with the strobilar scales as to form but one body, the double nature of which is only discoverable by a transverse furrow along the middle of the truncated terminations, by a mucro, evidently belonging to a bract, situate in the centre of the furrow, and by the double plate of woody matter, of which each scale is found to consist when divided longitudinally. In this respect, indeed, *Wellingtonia* corresponds with *Sequoia*; but the strobilar scales in the latter are few, unguiculate" [not more so than in *Wellingtonia*], "almost peltate" [only so if dried when immature], "and attached slightly to a weak axis" [only when immature, and on weak plants]; "whereas in *Wellingtonia* the scales are mere wedges, whose double woody interior communicates with an axis so hard and stout that a sharp chisel and a forcible blow are necessary to separate them." [The cones of *Wellingtonia* are certainly, when full grown, larger and stronger than those of *Sequoia sempervirens*, but they differ in nothing but size, and consequent greater firmness.]
>
> "The seeds of *Wellingtonia* correspond with Zuccarini's figure and description of those of *Sciadopitys*, both in form, number, and place of insertion upon the scales. *Sequoia* is different, having seeds far less thin, with a corky rather than a membraneous wing, fewer in number, and originating just within the edge of the unguiculate scales." [We fail to see any distinction between the two on the points here noticed by Dr Lindley.]
>
> "These considerations seem to leave no room for doubt that *Wellingtonia* is an entirely new coniferous form; and possibly, when its male flowers shall have been seen, still further distinguished by the structure of these parts."

In reply to these arguments, Decaisne maintained that two forms of foliage occur in a more or less marked manner in most Cypresses, not excepting the *Sequoia sempervirens*, which on the same branch often presents both imbricated and distichous leaves; that, as regards the structure of the fruit and seed, the common Red Wood *(Sequoia sempervirens)* and the *Wellingtonia* are identical, the only difference being that the cones of the latter were larger; that the structure was not like that of *Sciadopitys;* and, finally, that the wood of the two trees is similar, both abounding with the red colouring matter, soluble in water, from which the Red Wood takes its name. At the time when this opinion was given, neither Professor Asa Gray nor Professor Decaisne had seen the male flowers, which, as was said by the former, were alone wanting to confirm the perfect generic identity of *Wellingtonia* with *Sequoia*.

But further, if the generic name were to be abandoned, and the species placed under *Sequoia*, an objection arises to the specific name *gigantea*, that that name had been already used by Endlicher for another *Sequoia*, of whose identity botanists are not certain, but which is generally believed to be only a synonym of *Sequoia sempervirens*, and the same specific name ought not to be used twice in the same genus, even although its previous use may have been erroneous, and merely a synonym of something else. The policy of such a rule is apparent, as its neglect would add unnecessarily to the mountain of confusion which already weighs down botanical nomenclature.

These were the scientific objections to the name given by Lindley to this species; but others have been brought forward, principally by our American friends, of a less tenable nature. According to some of them the name is objectionable as not paying sufficient respect to American prejudices. The following droll specimen of Transatlantic declamation, from the pen of a Dr Winslow, shews the objections on this head:—

> "The name that has been applied to this tree by Professor Lindley, an English botanist, is *Wellingtonia gigantea*. By him it is declared to be so much unlike other Coniferæ, as not only to be a new species, but to require description as a new genus. Other botanists think differently. To this, however, he has seen fit to apply the name of an English hero, a step indicating as much personal arrogance or weakness as scientific indelicacy; for it must have been a prominent idea in the mind of that person that American naturalists would regard with surprise and reluctance the application of a British name, however meritoriously honoured, when a name so worthy of immortal honour and renown as that of Washington, would strike the mind of the world as far more suitable to the most gigantic and remarkable vegetable wonder indigenous to a country where his name is the most distinguished ornament. As he and his generation declared themselves independent of all English rule and political dictation, so American naturalists must in this case express their respectful dissent from all British scientific stamp acts. If the big tree be a *Taxodium*, let it be called now and for ever *Taxodium Washingtonium*. If it should be properly ranked as a new genus, then let it be called to the end of time *Washingtonia Californica*. The generic name indicates unparalleled greatness and grandeur; its specific name, the only locality in the world where it is found. No names can be more appropriate; and if it be in accordance with the views of American botanists, I trust the scientific honour of our country may be vindicated from foreign indelicacy by boldly discarding the name now applied to it, and by affixing to it that of the immortal man whose memory we all love and honour, and teach our children to adore. Under any and all circumstances, however, whether of perpetuity or extinction, the name of Wellington should be discarded, and that of Washington attached to it, and transmitted to the schools of future ages."

To this, the unreasoning, class of objections, there is of course no answer. To the reasoning class, the best answer which we have met with, besides his original justification of the genus above quoted, is given in a short note by Dr Lindley, published, with his permission, in the "Edinburgh Philosophical Journal," in 1860:—

> "Notwithstanding the criticisms of M. Decaisne, Dr Torrey, and Dr Seemann, I adhere to my opinion that *Wellingtonia* is necessarily distinguished from *Sequoia*, unless all the modern dismemberments of the old genera, *Pinus, Cupressus*, and *Thuja*, are to be cancelled, a measure in which I should not concur. It has not a little surprised me to find gentlemen who have no objection to offer to *Abies* as distinguished from *Picea*, *Sequoia* itself from *Taxodium*, *Selaginella* from *Lycopodium*, *Lastrea* from *Aspidium*, *Leskea* and *Neckera* from *Hypnum*, and so on, nevertheless opposing the establishment of *Wellingtonia*. Surely systematical naturalists must allow, that, as structure becomes simpler and simpler, so must distinctive characters be sought in smaller and smaller differences. To apply the method of classification suitable for *Rosaceæ* to such an order as the Coniferous seems to me unphilosophical."

This was Dr Lindley's view in 1860; but we are not sure that, before his death, his views had not undergone a material change; not, perhaps, as regards the principles he enunciates, which are certainly sound, but as regards the generic dismemberments of Conifers in general. In a criticism upon one of the earlier numbers of our present work, he said that he regretted that we had maintained the subdivision *Picea* as distinct from *Abies*, and we have often heard him in conversation stoutly maintain their identity. It

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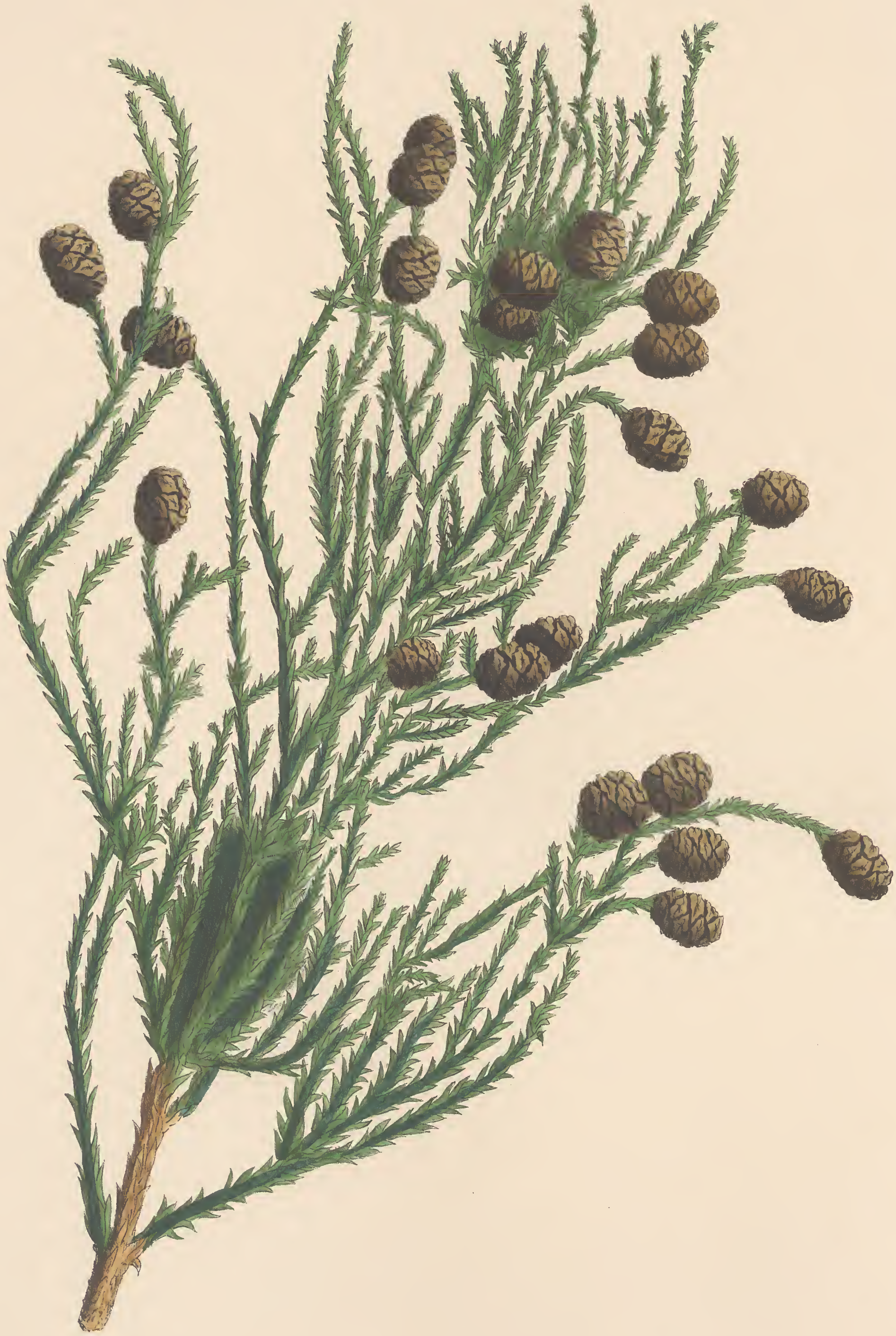

SEQUOIA SEMPERVIRENS.

W. H. M$^{c}$ Farlane, Lith$^{r}$ Edin$^{r}$

appears an inevitable corollary that, if these, which have many salient points of distinction, should be merged together, *a fortiori*, *Wellingtonia* and *Sequoia*, which have almost none, should be united too. It is unnecessary to say that the converse of the proposition does not hold: it is no reason that, because species differing little from each other should be classed together, those differing much should be so too.

At the early stage of the controversy (if it can be called so), we had adopted the views entertained by Dr Lindley. We had then seen the living plants only in their normal form, large, full-grown cones of the *Wellingtonia*, small stunted cones of *Sequoia sempervirens*, and no male flowers of the former. We considered the very marked apparent difference in the foliage to be sufficient, along with the difference in the cones, to constitute a distinct genus. We have now, with better material, come to a different conclusion. The materials which have convinced us that *Wellingtonia gigantea* belongs to the same genus as *Sequoia sempervirens* are, first, the male flowers. It is only now in the present season (1866) that we have at last seen them. Doubtless, specimens must have been procured by botanists from the aboriginal trees themselves in the course of the last ten or fifteen years, during which they have been known to men of science, and been objects of interest and constantly visited; but we never happen to have seen any; nor have we met with any description or figure of them. Indeed, we believe that the figures which we now give of them are the first which have been published. There were none in the British Museum or at Kew. At Kew, indeed, there was a tantalising specimen which had possessed a few male flowers; but they are very decadent, and the flowers of the specimen in question had all fallen off, leaving nothing but the stalk on which they had once grown. It was, therefore, with eagerness that we watched the young plants in this country when they began to shew symptoms of bearing fruit. It is now two or three years since cones were observed; but until 1866 no male flowers made their appearance. The first observer who drew attention to them was Mr Andrew Gilchrist, forester, Tilliechewan Castle, Dumbartonshire; and the next, Mr Cox, gardener to Mr Wells of Red Leaf, who exhibited fine specimens both of cones and flowers to the Royal Horticultural Society; but almost immediately afterwards, other notices of their occurrence appeared, and we received specimens from various quarters. On an examination of these, it is plain that they are in all respects identical in structure and form with those of *Sequoia sempervirens*. Fig. 27 shews the catkin of the *Wellingtonia* of the natural size, and fig. 28 that of the *S. sempervirens;* and figs. 29 *a b c* the scales of the *Wellingtonia*, and 30 *a b c* those of the *sempervirens*, in different positions. From these it will be seen that there is little difference except in size; the catkins of *sempervirens* being merely a little larger than the other: the flowers in this respect reversing the character of the cones, which are larger in *Wellingtonia*. The scales are, however, largest in *Wellingtonia*, and less jagged at the edges; the anthers, on the other hand, are largest in *S. sempervirens*. The only thing approaching a structural difference is, that in those which we have examined the anthers in *Wellingtonia* were borne inside the scale, while in *S. sempervirens* they were turned backwards and borne on the back; but both proceed from the free under-margin of the scale, and we have no doubt that this apparent difference in position is due to the different age of the specimens, and that when *Wellingtonia* is farther advanced its anthers will be turned farther back too. So far, therefore, as regards the male flowers, it is impossible to ground any separation upon them.

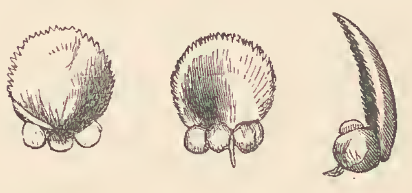
Fig. 29 *a*. Fig. 29 *b*. Fig. 29 *c*.
Male Flower of *S. Wellingtonia*.

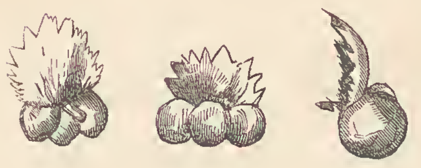
Fig. 30 *a*. Fig. 30 *b*. Fig. 30 *c*.
Male Flower of *S. sempervirens*.

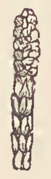
Fig. 27.
*S. Wellingtonia.*

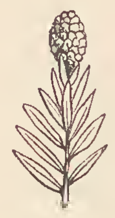
Fig. 28.
*S. sempervirens.*

The next material which convinced us of their generic identity is a most instructive specimen in the British Museum, obtained from Mr Bridges, the Californian collector. This is a good-sized herbarium specimen of a branchlet, of which we give a coloured plate, and on a hasty glance it might at once be set down as a specimen of *Wellingtonia*. Except at the tips of the young branchlets, the whole of the leaves are imbricated, and of the same shape and size as those of *Wellingtonia*. It bears several cones, which are a little larger than those which trees of the *Sequoia sempervirens* bear in this country, and every bit as large as those which the *Wellingtonia* has yet borne here; and in other respects is undistinguishable from them. If the reader will compare fig. 19 (which we repeat from page 3), which shews the young cone of *Wellingtonia* from trees in this country, with fig. 31, which represents the young cone of *Sequoia sempervirens*, he will see how little difference there is between them.

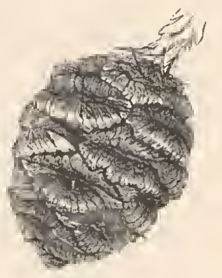
Fig. 19.
Cone of *S. Wellingtonia*.

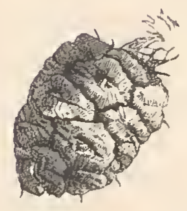
Fig. 31.
Cone of *S. sempervirens*.

There only remain the bark and the timber, the former of which is thicker and the latter lighter in the *Wellingtonia* than in the *Sequoia sempervirens;* but their general character is the same, both (as pointed out by Decaisne) abounding in the red colouring matter soluble in water, from which the latter takes its vernacular name of Red Wood. We know, moreover, that the quality of timber is by no means a generic character in Conifers, the timber of allied species often differing very materially in character and value.

Every ground for holding the two trees to be generally distinct has thus melted away, and nothing remains but candidly to acknowledge that *Wellingtonia* cannot be maintained as a distinct genus. Genera, however, are mere artificial aids to memory, and there is nothing in nature (nor in art, except the absurdity of giving more names than are necessary to a species) against making every species a genus, a step which some of our naturalists seem by their practice rather to approve. For them *Wellingtonia* will stand. That, too, will doubtless always remain in this country the colloquial name for the tree. We shall so use it; but regarded as a question of scientific nomenclature and natural affinity, it is, in our opinion, merely a second species of *Sequoia.* As to its specific name *gigantea*, that having been already used in *Sequoia* by Endlicher for the species *sempervirens*, we are compelled to abandon it and to take that next in priority, which is Dr Seeman's compromise, *Sequoia Wellingtonia.*

*Description.*—The tree is one of the largest known on the face of the earth, perhaps the largest. It is not so thick as the *Adansonia* from West Africa, or as some of the Leguminosæ from South America, nor so tall as the gum trees of Australia, some of which reach 450 feet in height. Nor does its ally, the *Sequoia sempervirens*, come far short of it in size, although it stands a little in the background. Still, the *Wellingtonia* is perhaps the most striking of them all, combining, more than any other, both enormous height and thickness. Its average dimensions, when full grown, are about 300 feet in height, and 90 feet in girth at the base. The dimensions of one of the fallen trees, whose top had been broken off, is estimated at 425 feet if the top had remained. Lord Richard Grosvenor ("Gardeners' Chronicle," 7th January 1860) speaks of one he had seen as being 450 feet high and 116 feet in circumference: a height taller than St Peter's, at Rome, and little short of that of the Pyramids. Mercantile men may bring home to their minds the enormous size of these trees in another way, viz., that used by Messrs Sang, who calculate the quantity of wood in a tree, and its price at a penny per foot of inch deal, which gives the astounding result of £6250 as the value of a single tree. Although this is a good mode of shewing the enormous quantity of timber in one of those trees, it would not do for practical calculations of its value; for, as we shall presently see, the timber, instead of producing a penny per foot, is worthless for any purpose yet known, and it would probably, therefore, bring no return at all.

The bark of a portion of the trunk of a large tree, known as the "Mother of the Forest," which has been erected in its natural position in the Crystal Palace at Sydenham, has doubtless given many of our readers the opportunity of forming for themselves some faint idea of the size of the tree. It is 93 feet in circumference at the base, 116 feet in height, and at the top is still about 45 feet in circumference. The tree from which it was taken was 363 feet in height. The American statement of the contents of that tree is, that it contained 600,000 feet of timber, that the weight of the trunk alone was upwards of 3,000,000 lbs., or more than 1700 tons (a large clipper-ship load). We need not follow them into their calculations of how many houses of comfortable dimensions a tree would build (240 we think it is), how many people could find shelter in the circumference of its trunk; nor narrate how, while it was exhibited in California, a pianoforte was placed by the American exhibitor within the circle of the bark, and quadrilles danced

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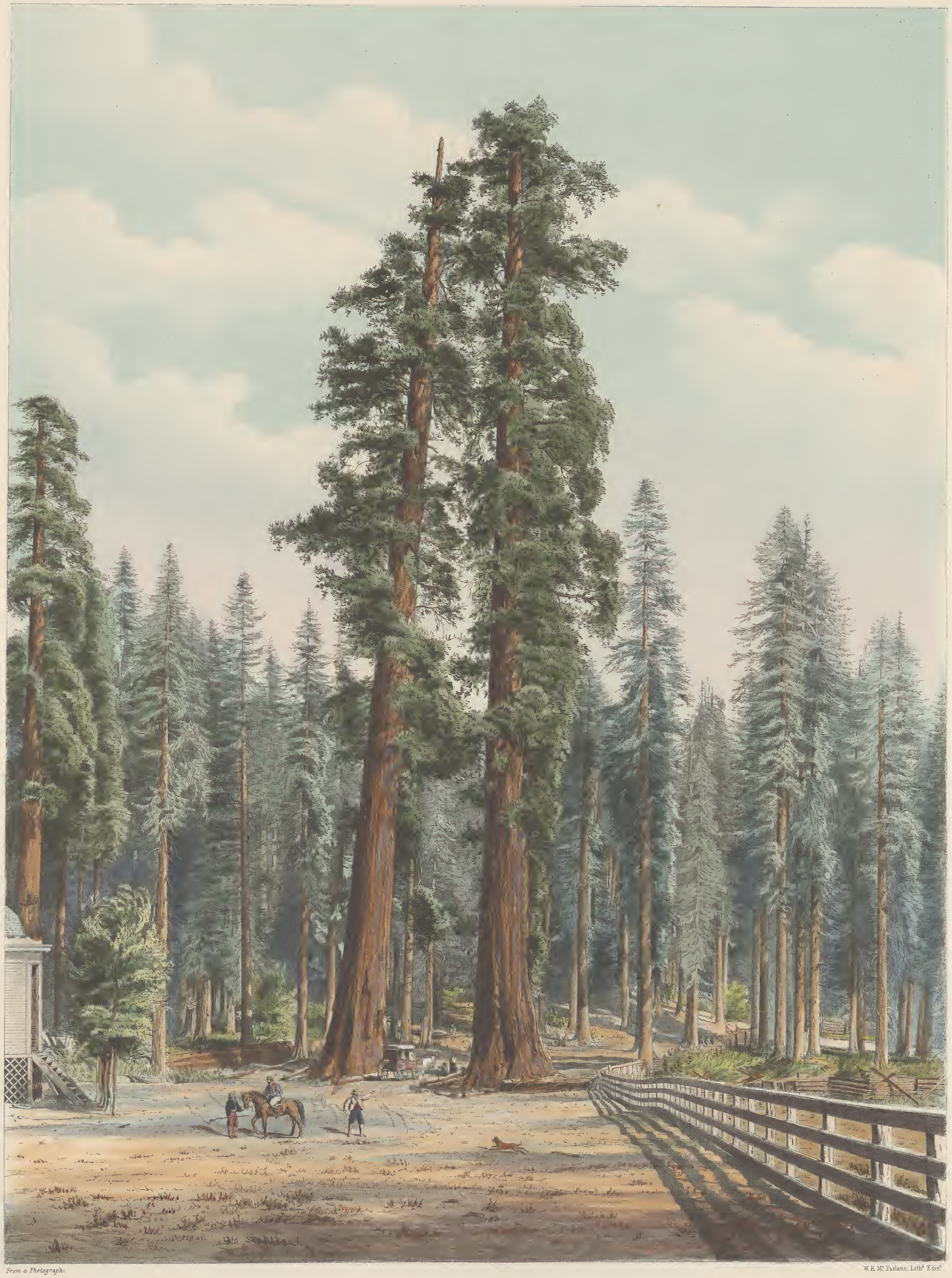

*From a Photograph.*

W. H. M$^{c}$ Farlane, Lith$^{r}$ Edin$^{r}$

SEQUOIA WELLINGTONIA.

THE TWO GUARDSMEN.

in it; nor how 40 chairs were squeezed into it; nor how there was said to be room for 200 people, and how 140 children were actually crammed into it. The dimensions speak for themselves.

Mr Lapham, the proprietor of the Calaveros or Mammoth Tree Grove, gives an interesting account of the dimensions of the trees in that grove. He tells us that most of the specimens now standing there are of the average height of 300 feet; one, however, the "Father of the Forest," as the specimen has been appropriately termed, must have been considerably larger. It has long since bowed its head in the dust, and now "lies at random carelessly diffused." It still measures 112 feet in circumference at the base, and can be examined for 300 feet where the trunk was broken by falling against another tree: it there measures 18 feet in diameter, and, according to the average taper of the other trees, this giant must have been about 450 feet high, and was no doubt one of the loftiest vegetable forms of the present creation. A hollow burnt cavity extends through the trunk for 200 feet, large enough for a person to ride through.

Dr Bigelow, in his "Botanical Report," thus describes this specimen:—

> "A short distance from this tree was another of larger dimensions, which apparently had been overthrown by accident some 40 or 50 years ago. It was hollow for some distance, and, when I was there, quite a rivulet was running through its cavity. The trunk was 300 feet in length; the top broken off, and, by some agency (probably fire), was destroyed. At the distance of 300 feet from the butt, the trunk was 40 feet in circumference, or rather more than 12 feet in diameter. Fragments of the same kind of tree, which had probably been exposed to the vicissitudes of climate and weather the same length of time, and supposed to be from the individual tree that lies prostrate, are to be found projected in a line with the main body, 150 feet from the top, proving to a degree of moral certainty that the tree, when standing alive, must have attained the height of 450 or 500 feet! At the butt it is 110 feet in circumference, or about 36 feet in diameter. On the bark quite a soil had accumulated, on which considerable-sized shrubs were growing. Off these I collected specimens of currants and gooseberries on its body, from bushes elevated 22 feet from the ground."

We may run shortly over the dimensions given by Mr Lapham of some of the other trees. "The Miner's Cabin" (they have almost all received names) measures 80 feet in circumference, and is 300 feet in height. The "Three Graces," growing on one root, are 92 feet in united circumference, and 290 feet in height. The "Old Bachelor," which, we are told, is a forlorn-looking individual, having many rents in the bark, and, withal, the most shabby-looking tree in the forest, is about 60 feet in circumference and 300 feet in height. "Husband and Wife," leaning affectionately towards each other, 60 feet in circumference and 250 feet in height. "Hercules," 67 feet in circumference and 325 feet high. "Addie and Mary" are each 65 feet in circumference and 300 feet high. "Uncle Tom's Cabin," 75 feet in circumference and 300 feet high. They seem all to rise like solid pillars, without a branch for nearly two-thirds of their height, often with furrowed bark, so as to look like fluted columns. The form or taper of the trunks of this tree is peculiar. When standing at their base, and looking up, the trunk appears to taper off very suddenly towards the top, and to end in a stump-like point, instead of running up in a slender spire. The great size of the body also extends high up. Speaking of the Mariposa Grove trees, Mr Blake quotes the dimensions of one at different points: "At 150 feet above the stump, the diameter is about 12 feet; 75 feet higher up, it is reduced to 6 feet; and 30 feet higher, to 18 inches." The swell at the roots is generally very regular, and the trunks cylindrical, and free from the deep furrows described as present in the trees at the Calaveros Grove.

The trees in Mariposa Grove are in a more exposed situation than those at Calaveros, and fall somewhat behind them in dimensions. From Mr Blake's paper, to which we have already referred, we learn the following details as to the size of the trees in this grove. The visitor in passing through the lower grove first meets a tree which is uprooted, and lies at full length on the ground, as complete a barrier to progress as a wall thirty feet high. The side of this huge trunk is ascended by means of a ladder and steps cut in the bark. Its dimensions, taken with a tape-line, were found to be 256 feet from the upper part of the swell of the roots to the top, where it was still 18 inches in diameter, all beyond this having been burned away. According to Mr Clark, above mentioned, who first saw the tree in 1857, it measured 268 feet before it was burned. Being partly imbedded in the soil near the roots, its size or diameter could not be readily ascertained, but was assumed to be about 25 feet. Beyond this there is a very fine tree known as the "Grizzly Giant," standing on a dry and rather rocky point, and visible to great advantage from the absence of many other trees around it. This tree is remarkable for the great size and number of its branches, which give it a considerable breadth of top, while in height it is inferior to many around it that are much more slender, and even to some of the Pines and Firs of moderate diameter. It measures 89 feet round the trunk, about 3 feet above the ground; but an additional 10 feet may be allowed for a large portion which is burned out of the side, making it, if perfect, about 99 feet in circumference, or 33 feet in diameter. Another tree beyond, and about the same girth, is bifurcated about 75 feet from the ground, the two parts being nearly equal in size and height. The trunks of two more trees were measured with nearly the same result; and on these grounds Mr Blake considers that from 30 to 33 feet may be considered the greatest diameter of the trees in this grove, as it also is of those in Calaveros County. There are many a few feet smaller than this; and it is satisfactory to know that there is no lack of young ones coming on, ranging from 10 to 20 feet in diameter. There are more than can be conveniently counted, besides groves and thickets of young trees of all sizes, from seedlings upwards.

The fires, however, which have swept through the forest, have destroyed a great number of the young trees, and ruined many of the largest and finest by burning at the roots, and running upwards through the trunk, in many cases burning out an arched way from side to side, high and broad enough for horsemen to pass through without touching. The fires burn out the centre of the tree most rapidly, and make hollow cylinders of those that have fallen; a peculiarity doubtless due to the tinder-like softness and porosity of the wood, and the density and toughness of the bark. Mr Blake mentions that at Mariposa there was, in 1861, a hollow trunk, now consumed, through which horsemen could ride upright for 150 feet, going in at the roots, and coming out half-way along the trunk; and when he visited the place, his own party rode erect for many feet into the interior of one which had fallen. In a low marshy part of the valley a line of medium-sized trees may there be seen growing on each side of a very ancient trunk, now completely decayed and moss-grown. All the appearances there indicate that trees have grown and fallen across each other for ages, giving extraordinary depths of vegetable mould.

Professor Brewer tells us (in a letter to Dr Hooker, published in the "Linnæan Society's Proceedings," vol. viii. p. 274) that the largest tree he saw in the Mariposa Grove was 106 feet in circumference at 4 feet from the ground. It had lost some buttresses by fire, and must have been at least 115 or 120 feet when entire: it is 276 feet high. He adds that the Indians tell of a much larger tree, which he did not see.

We have given a coloured plate, drawn from a photograph, of one of these Mariposa trees, which was 64 feet in circumference.

We quote the following details regarding the trees in this grove, from an account of a seed-collecting expedition, published in the "Edinburgh New Philosophical Journal" (April 1860). The expedition was undertaken by Mr Patrick Black, a young Irish gentleman, in 1859, long before the grove was so well known as it is now:

> "Well supplied with ammunition, he took his departure for the Mariposa Grove, which is a long way in the outer world: not that it is without its own inhabitants, its own hotel (kept by an old hunter), nay, even its own authorities, as Mr Black had like to find to his cost. He took up his quarters with the old hunter, who may rather be said to have kept *open house* than an hotel, as the sky was the only roof he had; a roof, apparently, not yet being considered essential to the comforts of an hotel in these parts, although one might have thought that it would, seeing that the grove is about 5000 feet above the level of the sea, and there was frost every night while Mr Black was there.
>
> "He visited the grove daily, shooting down a cone or two to make sure that they were ripe before he should begin to make his collection. He soon found, however, that it would take a battery of ammunition and an army of sharpshooters to make even a moderate collection of seeds. The seed is exceedingly small and thin, a mere scale, and the cone is also small (not much larger than the cone of an ordinary Scotch Fir), so that the product of the whole week's shooting might be held in one's waistcoat pocket. Mr Black soon tired of this; and seeing one or two trees of less size than the others, came to the conclusion that it would be easier to fill his wallet by cutting down a tree than shooting down the cones; so, boldly putting behind him the fear of the anathemas of the "New York Herald," and of the "Gardeners' Chronicle," as well as the nearer terror of the local authorities, he at once, with the assistance of his host and two Frenchmen (that the three most civilised nations in the world might all be represented in the perpetration of the sacrilegious deed), proceeded to put his intent into execution. They first selected the smallest tree in the grove; it was 24 feet in circumference, and took Black and the hunter three days' hard work to level with the ground, one cutting on each side of the tree. Increase of appetite growing by what it fed on, another and another fared the same fate, until they had actually cut down four of these
>
> magnificent

magnificent trees; the last and largest, being 42 feet in circumference, took a week to cut and fell before the two Frenchmen; not, however, before the echoes of their axes reached the ears of Judge Lynch, who soon stopped their fun, and, in simple but unmistakable language, gave them to understand that it would be 'dangerous' to try it again. In fact, so soon as they heard of it, the authorities interfered; and although they did not lynch Pat (which would not have set the trees up again), they told him they would if he cut any more."

This was not the first time that specimens of these giant trees had been felled. That piece of vandalism (as it was then justly considered, when only one grove and about 90 large trees were known in the whole world) had been already perpetrated at the Calaveros Grove, and the "New York Herald" and "Gardeners' Chronicle" had both made stirring appeals to the public and the authorities in California to take steps to prevent any repetition of it.

Dr Torrey thus describes the cutting down of the first trees which fell:—

"The earliest accounts of the Mammoth Tree which reached Europe were coupled with the sad intelligence that a piece of vandalism had been perpetrated in Upper California unexpected in our enlightened days. One of the finest trees in the grove, we were informed, had been felled for the purpose of being publicly exhibited. This individual was 96 feet in circumference at the base, and solid timber. The work of destruction commenced by boring with augers, and sawing the spaces between—a labour engaging 25 men for 5 days (and costing, according to Dr Bigelow, 550 dollars, or £110). But when this was done, the tree was found to stand so nearly perpendicular that it would not fall; and it was only by applying a wedge and battering-ram, during a strong breeze, that the trunk was finally upset. In falling, it convulsed the earth, and by its weight forced the soil from beneath it, so that it lies in a trench; and mud and stones were hurled near 100 feet high, where they left their mark on the neighbouring trees. A section of two feet long taken from the stump, also a portion of the bark, were both exhibited. The success with which the public exhibition of those specimens in San Francisco, New York, and Paris, had been attended, induced, in 1854, another speculator to strip a second magnificent tree, the 'Mother of the Forest,' up to a height of 116 feet, of its bark, fortunately without affecting by this ruthless process the vitality of the tree. It required the labour of 5 men 90 days. During this time, a person had a fall of 100 feet from the scaffolding, and, curiously enough, escaped with a broken limb. The bark was removed in sections 8 feet in length, and each piece marked and numbered, so that it could be put up in precisely the same position that it occupied on the tree. It was then, after being carted 80 miles overland, shipped down the river to San Francisco, and thence on a clipper vessel, round Cape Horn, to New York, where, after being exhibited for a season, it was transmitted to London, and was for the first time on view (April 1856) in the Philharmonic Rooms, and afterwards at the Adelaide Gallery. But both of these localities were too low to admit of the whole sections of the stripped bark being put up; nor, indeed, was there any other available building in the British metropolis which could serve this purpose. Fortunately, the Crystal Palace at Sydenham possessed the necessary height; and, ever since the autumn of 1856, the whole of the bark, to the height of 116 feet, has there been exhibited."

For more than ten years it stood there, the observed of all observers. It might truly have been said to "bid kings come bow to it," for who so royal, so great, so learned, or so wise ever came to London but he visited the Crystal Palace, and saw this wonder of the vegetable world? It was not alone an instruction to Londoners or Englishmen. The whole world profited by its presence there. It is now, alas! a thing of the past. On 30th December 1866 it was consumed in the conflagration which destroyed the north wing of the Crystal Palace. A few charred fragments, raked from the debris of the fire, the largest a slab of about 2 feet long by 1 foot broad, are all that now remain of this world-famed specimen. It does not appear to have at all sustained the fireproof character of the bark in its native forests; but it must be remembered that in the Crystal Palace it had been for ten years under cover, in a part of the building constantly heated to a tropical temperature, so that the substance of the bark had almost acquired the qualities of tinder (see "The Farmer" for Jan. 9, 1867).

As so many groves are now known, a tree or two could well be spared from them for the Crystal Palace, and it is to be hoped that it will not be long ere even a finer bark skeleton of the *Wellingtonia* again instructs and interests the crowds that throng to that favourite place of resort of the people.

Attempts have also been made to obtain an actual section of the tree for exhibition. In 1854, the authorities at the Crystal Palace tried to get one (to be not less than 30 feet in diameter), and they were willing to expend between £300 and £400 for the purpose. They found, however, that such a slice could not be obtained for the money; because the *Wellingtonia* grows far inland, and the expense of getting it down to the coast would have cost more than the sum offered, not to speak of the difficulty of transporting it across the Atlantic afterwards. One of *Sequoia sempervirens* might perhaps have been got, because it grows in some places down to the water's edge, and thus might have been more easily transported; as, indeed, was managed by some speculators, who exhibited at Philadelphia a section 12½ feet in diameter, taken at 25 feet from the ground.

It would appear, from the account already quoted of Mr Black's proceedings, that the time stated to have been occupied in felling the trees at Calaveros Grove is either exaggerated, or was unnecessarily long. Being twice the diameter, it might require four times the work; but 25 men for 5 days gives more than eight times the work. It also shews, what we know from the specimens of the wood itself, that the timber is extremely soft, very light, and easily worked, in appearance not unlike the Cedar-wood used for pencils, but much lighter: when freshly cut it is white, but speedily acquires the Cedar hue. It is so brittle, that one of the trees cut down by Mr Black, in falling snapped in three places before it reached the ground, carrying away whole forests of *Picea nobilis* and Pine trees before it; and we see, from the various figures and photographs which at different times have been sent home of the trees, that a great proportion of them look as if they had been broken off near the top. It seems as if a third of their height had been carried away; and it has been suggested that, but for the loss of their tops, those trees, now only 300 feet in height, would have been standing 450 feet high. But the remarkable thing is, that all the mature trees grow up straight and columnar for enormous distances, and none of them ever taper off in the same proportion to the point. Other Conifers, as the Pines and Firs, grow in a regular proportion, as shewn in fig. 32; but the *Wellingtonia*, when it has almost reached its extreme height, suddenly contracts its breadth, and makes a rapid and abrupt termination, as in fig. 33. The suggestion that this has arisen from the top having been broken off by winds can, however, scarcely apply to all; and the knowledge regarding its early proportions which we now possess rather suggests a different explanation. We see in these young trees a repetition of the top growth of the old ones: an enormously disproportioned (according to our ideas of Conifers) breadth at the base compared with the height [fig. 34]. For example, a tree at Basing Park, 14 feet high, was 2 feet 9 inches in circumference at 6 inches from the ground; and only 1 foot 6 inches at 4 feet from the ground; and a fine example at Bedgebury Park is 15 feet high, and 3 feet 10 inches in circumference at the ground, and 1 foot 10 inches at 3 feet from the ground. In fact, its proportionate breadth at the base is just about double that of other Conifers. In *Abies Douglasii*, for instance, the circumference of the base is from an eighth to a tenth of that of the height. In *Wellingtonia* we see that it is a fourth of the trunk. We, therefore, rather imagine that the abrupt termination, which we see in the figures and photographs of the old trees, is natural, and not the result of breakage by winds, and is one of nature's adaptations to protect the tree from its own fragility; that the growing green part is always comparatively obtuse, and carries its obtuseness with it up the tree, but that it ceases where the trunk becomes solid and leafless. This is sufficiently proved by the fact, that the relative proportion of the diameter of the base to the height is the same in both young and old trees, although in the young the slope is equal from base to top [fig. 34], while in the old [fig. 33] it is not: the form in the one being that of an extinguisher, in the other that of an obelisk.

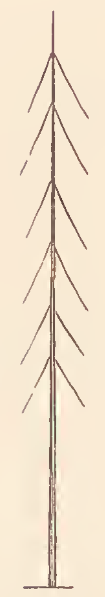
Fig. 32.

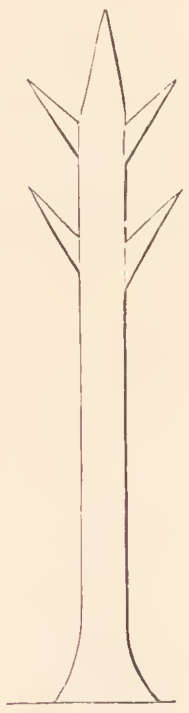
Fig. 33.

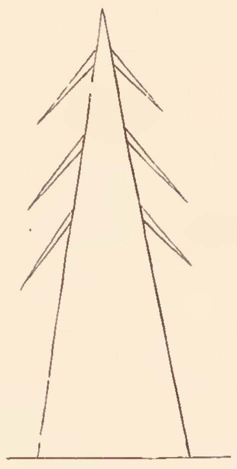
Fig. 34.

We know of no dicotyledonous tree whose timber is so excessively soft, light, and brittle. These are, of course, anything but valuable properties, where strength, tenacity, and hardness are wanted. But everything has its use, if we only knew what it was; and we may rest assured that the wood will be found to be the most valuable and fittest that could be procured for some purpose not yet thought of, but which, in due time, will occur to some ingenious practical person. But if the wood is brittle, the bark is not. Mr Black and his friends found it a great deal worse to cut through than the wood. It is tough and stringy, like coir or the husk of a coco-nut, and is from a foot to a foot and a half in thickness. It furnishes a striking instance of those compensatory arrangements by which we find the existence of contradictory qualities in the same individual reconciled.

It is obvious that if the *Wellingtonia*, being so fragile, were coated with bark of only a common thickness and ordinary consistence, it could never live to be a tree: it would be snapped across so soon as it reached a sufficient height to give the wind a hold upon its branches; but with a coating of bark so thick, so tough, so stringy, so spongy, and so elastic as it possesses, it is kept in its place, and protected from its own fragility. It is applied, too, in the same way, and on the same principle as is adopted by ourselves in packing and supporting anything that is fragile; and this support is given after the fashion which modern science has ascertained to furnish the greatest amount of strength with the least waste of substance. The bark is constructed on the plan of the corrugated roof; a network of corrugated layers of harder texture being placed longitudinally round the tree, while the interstices are packed with a soft, light, elastic, spongy padding.

Another adaptation of structure to purpose exhibited in this tree is the gnarled expansion of its trunk at the base, which supports it against the wind by what may be styled a circle of buttresses.

Looking at the enormous magnitude of this species, it was natural that a correspondingly great age should be ascribed to it. It is, therefore, no wonder that Dr Lindley, in describing it, allowed his imagination to luxuriate in the strange associations which its size and antiquity evoke. "What a tree is this," says he, "of what portentous aspect and almost fabulous antiquity! They say that the specimen felled at the junction of the Stanislaus and San Antonio was above 3000 years old; that is to say, it must have been a little plant when Samson was slaying the Philistines, or Paris running away with Helen, or Æneas carrying off good Pater Anchises upon his filial shoulders."

But this estimate of its age is obviously taken only from the reports which first reached this country. It was not until the acts of vandalism, so much condemned by scientific men, had been committed, that these gentlemen had thereby the opportunity of ascertaining its real age.

It does not appear from what source Dr Lindley drew the report that the tree had reached an age of 3000 years—probably from Mr Lobb, from whom he received the rest of his information; but however derived, Professor Asa Gray presently shewed, by actual counting of the rings of an imperfect section (of *Sequoia sempervirens*), that this age was probably much exaggerated, and that the duration of the tree was most likely not more than 2000 years. A perfect section, or rather semi-diameter, of *Wellingtonia* (11½ feet in semi-diameter, *i.e.*, 23 feet in diameter, had the section been complete) was soon afterwards examined by Dr Torrey, and the following were the rates of growth found by him in that tree:—

| | | | |
|---|---|---|---|
| The 1st 100 layers occupied | 17½ inches. | The 7th 100 layers occupied | 7¾ inches. |
| „ 2d „ „ „ | 14 „ | „ 8th „ „ „ | 11 „ |
| „ 3d „ „ „ | 12 „ | „ 9th „ „ „ | 10 „ |
| „ 4th „ „ „ | 13 „ | „ 10th „ „ „ | 11 „ |
| „ 5th „ „ „ | 16¼ „ | „ 11th „ „ „ | 11¼ „ |
| „ 6th „ „ „ | 8¾ „ | Remaining 12th „ „ „ | 1 „ |

These results shewed that the tree examined was only about 1200 years old. Dr Bigelow, in his Botanical Report (*loc. cit. supra*), says, "As considerable discussion has already been had with regard to the age of this tree, I may state that, when I visited it in May last, at a section of it 18 feet from the stump, it was 14½ feet in diameter. As the diminution of the size of the annual rings of growth from the heart or centre to the circumference or sapwood appeared to be pretty regular, I placed my hand midway, roughly measuring 6 inches, and carefully counted the rings on that space, which numbered 130, making the tree 1885 years old. Since I came home, Dr Torrey tells me he has actually counted every ring of a section of the tree, and found the number a little over 1100."

Mr Blake, in the paper already referred to, says that, from a partial count at the end of one of the burnt trunks at the Mariposa Grove, he judged that there might be from 1800 to 2000 annual rings (apparently more than in the stump of the Calaveros tree). He acknowledges, however, that the opportunities for determining the age of the trees is not so good at Mariposa as at the Calaveros Grove, for one has been there cut down, and cleanly cross-cut, on purpose to fully expose the rings.

At the International Horticultural Meeting recently held at South Kensington (May 1866), Professor de Candolle gave an account of a very exact measurement, recently made by M. De la Rue, of the trunk

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of one of these trees, viz., that known as the "Old Maid." This tree had been broken off by a storm at a height of 128 feet, and its base cut across now serves as a dancing floor. M. De la Rue measured the annual rings in the following way: a slip of paper was stretched across the diameter of the trunk, the annual rings being marked off with a pencil on the paper, according to the convenient method originally proposed by Augustus Pyramus de Candolle. He found that the diameter at the height of about six feet was 26 feet 5 inches. The entire height of the tree, before it was broken by the wind, was, approximately, 350 feet. The number of rings was counted by M. De la Rue and his assistant, one going from the circumference to the centre, the other in the opposite direction. The one counted 1223 rings, the other 1245. The mean of the two observations, which is no doubt nearly correct, gives the tree an age of 1234 years, which is not an extraordinary one for trees, especially Conifers. There are, for instance, Yew trees which date back from the Christian era. The *Sequoias* grow in a deep and rich soil, and their rate of growth appears to have been very uniform. Thus, on the slip of paper it might be seen that, at the age of 400 to 500 years, the annual rings were still thick, while in ordinary trees the layer becomes thin at from 80 to 120 years, according to the kind of tree and other circumstances.

But although the individual specimens whose rings have been counted were only about 1200 years old, we do not think that it by any means follows that that is the extreme measure of the life of the tree. In the first place, there is no physical impossibility in their reaching a much greater age. The Yew trees above referred to are an evidence that allied trees do, and we think there is good ground for holding that the oldest Cedars in the grove at Lebanon exceed 2000 years in age. Besides this, there are *Wellingtonias* much larger than those whose rings have been measured. "The Father of the Forest," above spoken of, was a third larger, and it seems only reasonable to infer, that he should have been at least a third older. The growth of the annual rings misleads us in our calculations of age only when it is misapplied. They diminish in breadth as we go outwards. Therefore, if we take the outer rings, and, finding that so many occur in an inch, estimate the whole interior of the tree at the same rate, we must necessarily overrate their number; in the same way that we should equally underrate their number if we started from the centre and reckoned only from the breadth of a few of the inner rings.

The tree, the breadths of whose rings are above given by Dr Torrey, measured 23 feet in diameter, and that by Professor de Candolle 26½, or about 75 feet in circumference. The girth of "The Father of the Forest," even as now left, is 110 or 112 feet. It therefore must have had a diameter of 11½ feet more than Dr Torrey's, which, to equal it, would require a circlet of 6 feet additional to be applied all the way round the trunk of the tree. How many annual rings would it take to make up this additional diameter?

It is clear that if we take the rate of growth at which his tree was growing when cut down, that is, the outer rings, we shall not over-estimate the number; any that would have grown after them must have been smaller in breadth, not greater. We must, however, take it fairly; and as in it there was a sudden diminution of active growth during the last hundred years, it having only grown an inch during that period, in opposition to about a foot in each of the previous hundred years for some centuries previously, we think it would be scarcely fair to take the inch as the standard for every future hundred years' growth. We regard the inch in the final hundred rather as the indication that the tree had reached its maturity, and had, what in man is called, "stopped growing;" and we suppose that until it reached this period of decadence, it went on growing at the rate of a foot in a hundred years without allowing for any small addition after having stopped growing. This would give us upwards of 2000 years as the period of life of the "Father of the Forest;" but as we have 100 years to add to Dr Torrey's for an inch after cessation of active growth, some allowance of a similar nature should be made in this case too, which might bring its age up a few hundred years more. If we were to take that last 100 years' growth as the normal rate after a tree had reached 25 feet in diameter, it would make the age of the "Father of the Forest" 8200 years, or even more; for, small as the breadth of the annual rings taken to start with is, they would still go on progressively diminishing *ad infinitum*.

Dr George Lawson, now Professor of Chemistry and Natural Science at Halifax, in Nova Scotia, in a paper which he read before the Edinburgh Botanical Society, in March 1854, "On the Anatomical Structure of Coniferæ and other Gymnogens," was the first to record the microscopical structure of the *Wellingtonia.* It does not differ from other Conifers. Like them, it presents a single or double row of discs on a radial longitudinal section, which, as well as their central dot, are sometimes elliptical, sometimes round. Figs. 35 and 36 shew the disposition of these discs. The discs lie side by side, and do not alternate as in the *Araucarias:* they are more oblate than in the true Pines, and seldom occur in double rows. The structure on the transverse section resembles very much that of *Taxodium distichum* (the deciduous Cypress), although the reticulations are larger. Fig. 37 shews these reticulations in *Wellingtonia.*

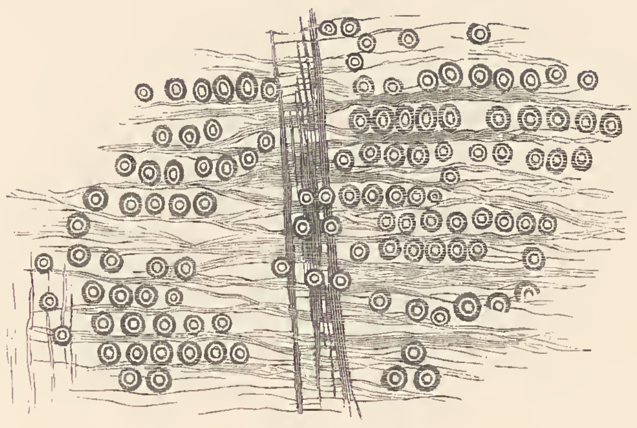
Fig. 35.

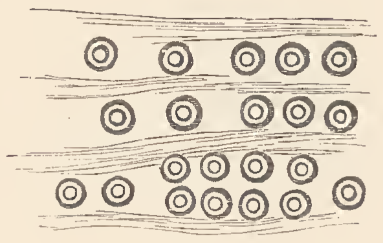
Fig. 36.

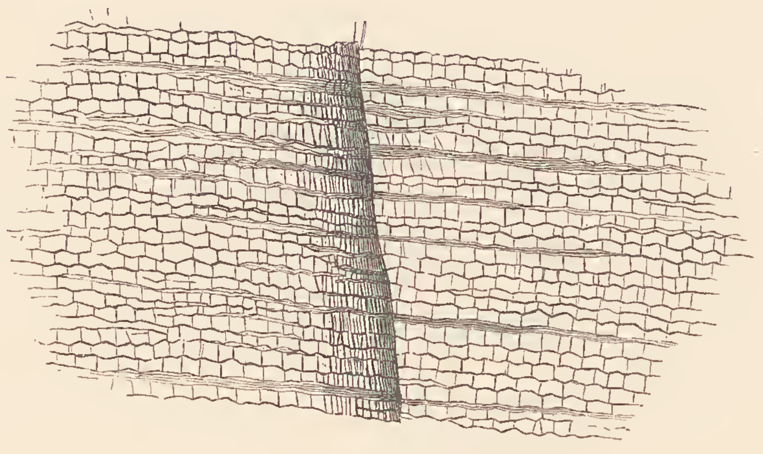
Fig. 37.

The timber and bark, as well as the cone, seem to be largely charged with a dark garnet or crimson coloured substance, exuding and hardening into a consistence like gum. Dr Clelland, Professor of Anatomy in the University of Belfast, tested it, and found it entirely soluble in water; it gave with protosulphate of iron a blue-black precipitate; with sesquimuriate of iron, a grey precipitate; and a precipitate with gelatine. It is thus a form of tannin, and may be called a sort of kino; and the *Wellingtonia* may thus supply a valuable substitute for Oak bark.

As already said, if the green chlorophyll be removed from the cone, a ligneous core remains, which, as in other Conifers, but in a more marked degree, extends into the scales like branches, composed of numerous small fingers. These finally extend like two plates into the upper and under part of each scale, as shewn in figs. 23 and 24. This structure has a bearing upon more than one of the theories which have been proposed to explain the structure of cones: some holding that the scales are converted leaves, or, rather, two connate leaves, or leaves applied to each other, forming the outer and inner half of the scale; others that the bracts are the leaves. The structure here shews that the former can hardly be the case. Not only are the scales composed of a flattened blade of ligneous tissue continuous with the axis, but both the outer and inner sides of the scales are merely continuous extensions of the same plate, like two blades in one knife. The same double layer of woody fibres can be traced in the disc of the hip of the Rose tree.

*Geographical Distribution.*—Like a great many of the trees of North-west America, the *Wellingtonia* seems to be confined to isolated patches; and, indeed, it is a curious fact applicable to all trees, that trees, as distinguished from other plants, generally have restricted ranges.

The first place where it was found was at the spot already mentioned, called Calaveros Grove (now more generally known as the Mammoth Tree Grove), near the head-waters of the Stanislaus and San Antonio Rivers, in lat. 38° N., long. 120° 10′ W., and about 4590 feet above the sea-level. The number of trees still standing there is about 200, of which 92 are of large size.

The next locality discovered was the Mariposa Grove, about 50 miles south-east of the Calaveros or Mammoth Tree Grove. It is situated on the line between Mariposa and Fresno counties, and but a few miles south of the trail leading from the Mariposa estate to the Yo-Semite valley. It is about 5000 feet above the sea, and on the western slope of a high ridge of the Sierra Nevada, from which there is a fine view of the desert-like plains of the San Joaquin in the distance. According to Mr Blake, the ascent to the trees from Clark's, in the valley of the south fork of the Merced River, is over undulating spurs and ridges covered with magnificent forests of Pines, Firs, and Spruces, and almost without undergrowth, the smooth surface being broken only at wide intervals by outcrops of gneissic rocks. The trees are spread along a lateral valley, on the flank of the main ridge, in two groves, about half a mile apart, known as the Upper and Lower Grove. The number of trees of fair size in the Upper Grove is said to be 450; in the Lower nearly 200; or about 600 in all.

A third grove, containing about 500 trees, has been found in Fresno county, eight miles south-east of the Mariposa trees. The trees in this grove are in a valley sheltered from high winds, consequently some of them are probably taller than any in Mariposa. Mr Clark, who visited them, says that two of the largest measure each 81 feet round the trunk, three feet above the ground.

Another grove is reported by Mr Blake as having been discovered further south and east upon the Kaweeab (perhaps what in some maps is spelt Caweha), or Four Creeks, or about 50 miles from Visalia. This probably is the same as the station noted by Professor W. H. Brewer, of the State Geological Survey of California, in the letter to Sir William Hooker, to which we have already referred. He says:—

> " An interesting discovery this year has been made of the existence of the big trees in great abundance on the western flanks of the Sierra Nevada, in about lat. 36° or 37° N. They are very abundant along a belt at 5000 to 7000 feet altitude, for a distance of more than 25 miles, sometimes in groves, at others scattered through the forests in great numbers. You can have no idea of the grandeur they impart to the scenery, where at times a hundred trees are in sight at once over 15 feet in diameter, their foliage contrasting so finely with their bright cinnamon-coloured bark. I found trees larger than they occur further north, in the Calaveros and Mariposa Groves."

He adds, and in doing so confirms Mr Blake's observation on the Mariposa Grove:—

> " There seems no danger of the speedy extinction of the species, as it is now known in quite a number of localities; and, contrary to the popular notion, there are immense numbers of younger trees of all sizes, from the seedling up to the largest. There has been much nonsense and error published regarding them."

It thus appears that there is a belt, or rather a strip, of these interesting trees running along the western flank of the Sierra Nevada, parallel with its crest, for 120 miles or more, and at about the same elevation on the flank of the chain, much broken, it is true, by the many river valleys and deep ravines, but indicating a continuity before the river valleys were excavated to their present great depth.

Besides the above well-authenticated localities, the tree is also said to have been met with in Carson Creek, a few miles to the north of the Mammoth Tree Grove; and Carrière states that an officer of the French navy brought cones identical with those obtained in California, from a latitude about ten degrees north of those localities; but the identity of these cones with those of the *Wellingtonia* has been doubted. It is said also to have been met with in various other parts of the Sierra Nevada; but if so, it does not there attain the gigantic dimensions of those in the groves above mentioned.

Whether its range may not be still more extensive we cannot yet say. Various reports of its having been observed in other districts have from time to time got into currency. For example, we learn from a San Francisco French newspaper,* of 17th November 1864, in which is published an account of the *Alpes Californiennes*, professing to be derived from the " Travaux de la Commission Geologique de California," that Dr Cooper states that he saw, in the mountains of San Diego, some trees of which the foliage, according to his belief, was intermediate between that of the *Wellingtonia* and the Red-wood (*Sequoia sempervirens*). This must obviously have been the *Sequoia sempervirens*, because we know that it at times assumes the foliage of the *Wellingtonia*, having some branches with imbricated leaves, and others with distichous foliage; while the *Wellingtonia* has never been observed to shew distichous foliage. In the same

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* We regret that we cannot give the name of the paper from which we cite these quotations. We received them from a friend, who sent the article clipped out of the paper without its title. We are also unable to say how far the remarks quoted are extracts from any Report of the Geological Commission of California, from which they are said to be taken, and which we have not seen, or merely the substance of the Report.

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same article, the statement occurs that " the author of this article saw in 1849 (that is, the year before the discovery of the *Wellingtonia*), upon the lofty plateaux which are crossed by Lassen's route (now part of the county of Shasta), a number of trees, the bark of which had all the characters of that of the *Wellingtonia*, notwithstanding that their size did not exceed three or four feet in diameter."

This locality is very much out of the range within which the *Wellingtonia* has yet been found; and seeing that that occupies a well-defined relative position on the mountains, both as regards elevation and direction, we have little hesitation in coming to the conclusion that the trees seen by this author were, in all probability, not *Wellingtonias*.

*History.*—The *Sequoia sempervirens*, or a species most closely allied to it, *S. Langsdorfii*, existed in the Miocene epoch both in Europe, Polar America, and California, and has survived the Glacial epoch, and come down to us in its present form. No traces of an imbricated form of *Sequoia*, from which we might infer the existence of *Wellingtonia*, have, however, been met with. It is perhaps, therefore, not an improbable conjecture, that it did not appear until after the Glacial epoch; and that it was to the change in climate which then took place that its appearance is to be referred. We have seen that it occupies a position along the west flank of the Sierra Nevada, at from 4000 to 5000 feet of elevation. Most plants which occupy a position high in altitude have their representatives also in a more northerly locality at a lower level. The *Wellingtonia* has not. We hold the view laid down in the " Geographical Distribution of Animals and Plants," * that neither plants nor animals readily change their original specific birthplace; and that the northern hemisphere has gradually been recovering its heat since the Glacial epoch, and still continues to do so. In conformity with that view, we imagine that the *Wellingtonia* appeared at the time when the Sierra Nevada was 5000 feet lower than it now is: that is, when the locality of the Sierra, where *Wellingtonia* is now found, was level with the sea, and when the climate at that lower level corresponded with that of the higher level which it now occupies. Such speculations, if only presented as speculations, are perfectly admissible. The following out the trains of thought suggested by similar hypotheses or theories has done much to enlighten us on the past history of the globe.

Leaving them, however, and turning from the region of fancy to that of fact, from the geological to the historical times, we know this much of the early history of the trees from the annual rings of growth, that the groves where they now grow have existed for at least 1000 years, probably thousands of 1000 years. They were discovered by civilised people in 1850, but were previously well known to, and admired by, the native Indians, who called them *Wa-wo-nah*, meaning Great Tree. Their ancestors must have paused awe-stricken under their shade or ever Columbus crossed the Atlantic; and they still know more about them than the settlers in North-Western America. They speak of trees larger than any yet known to the latter. But so far as the researches of the civilised explorers have gone, the places where groves of the tree have been met with are only those above-mentioned.

Who of the reading and writing races first discovered them is already matter of uncertainty and dispute. Douglas makes the following remark, in a letter published in Hooker's "Companion to the Botanical Magazine," vol. ii. p. 150:—

> " But the great beauty of Californian vegetation is a species of *Taxodium*, which gives the mountains a most peculiar, I was almost going to say awful, appearance, something which plainly tells us we are not in Europe. I have repeatedly measured specimens of this tree 270 feet long, and 52 feet round at 5 feet above the ground. Some few I saw upwards of 300 feet high, but none in which the thickness was greater than those I have instanced."

This passage led to the belief that the *Wellingtonia* was first seen by Douglas in his Californian explorations; but this is now known to be a mistake. Mr William Lobb has shewn, from the route followed by Douglas, and which is perfectly known, that he never came within a hundred and twenty miles of any of the habitats of this tree. What he saw was *Sequoia sempervirens*, as may be otherwise inferred from the terms in which he speaks of it.

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* " Geographical Distribution of Mammals," by Andrew Murray. Day & Son, London.

A writer in a recent number of "Blackwood's Magazine" says that it was first discovered in 1850, by a Mr Dowd, who, when out hunting, was led by a herd of deer which he was following into the Big Tree Valley. He stopped as one enchanted, feeling like Gulliver when lost in the field of barley in Brobdignag: the deer were forgotten, and he gazed with utter astonishment on monsters of vegetation such as he had never even dreamed of as existing in the world. He told his companions of his adventure on his return, but all laughed at his story as a barefaced attempt to impose on their credulity. It was with the greatest difficulty he succeeded in inducing some of them to accompany him to the spot, and verify his statements by actual inspection and measurement.

The happy individual to whom common fame more generally ascribes the discovery is a Mr J. M. Wooster, whose claims have rested on an inscription, "J. M. Wooster, June 1850," cut *more Anglico* into the bark of one of the trees—"Hercules," to wit. As this token of discovery has been mentioned in the very earliest notices of the tree, there is no doubt that the date of the inscription is genuine, and that it is not an *ex post facto* operation. It has been jestingly said that this is only a manuscript notice, and not publication, and therefore that Mr Wooster is not entitled to the honour of the discovery, which must go, in right of priority, to the first person who published his discovery, Mr Lobb. But Mr Wooster himself disclaims it. Mr Hutchins, in his "Scenes of Wonder and Curiosity in California," says,—"Since writing the above, we have made the acquaintance of Mr Wooster, who disclaims all title to the discovery, although of the same party, and gives it to W. Whitehead, Esq., who, *while tying his shoe*, looked casually round him, and saw the trees, June 1850." We confess we feel disposed to give the palm of discovery to Mr Whitehead: the simplicity and vraisemblance of the discovery made on looking up from tying his shoe carry conviction to our mind. The incident of tying his shoe is the last that would occur to an inventor. A romancer would scarcely think of a party passing through the grove, without noticing the enormous size and height of the trees; and yet what more natural than that people, not botanists, who have been passing through forests of all sizes, and not thinking about trees, but intent on other objects, might pass hurriedly through them, and never observe the trees? It would only be when something made them pause, and allowed their attention to wander a little to surrounding objects, that the extraordinary magnitude of the trees might strike them. It is no doubt exceedingly probable, and doubtless true, that Mr Dowd discovered them in the same year, and possibly within a few days or weeks of Mr Whitehead; but, in the absence of data for determining which of them was first, we should certainly, for our part, place ourselves on the side of the man who discovered them while tying his shoe.

The rumour of the discovery soon spread, and the grove was visited by many. Amongst these early visitors were two of our countrymen, who at least were the first to introduce the tree into Britain—Mr John D. Matthew, son of Mr Patrick Matthew, of Gourdiehill, near Errol, and Mr Lobb, who was collecting for Mr Veitch. The credit of introducing it is generally awarded to Mr Lobb; and, so far as regards introducing it in commercial quantities, no doubt he was the introducer. But *suum cuique tributo*. The first seeds received in this country were sent by Mr Matthew, and the oldest plants are those which were raised from them. Mr Lobb returned from California in December 1853, bringing his seeds with him, as appears from an article by Dr Lindley in the "Gardeners' Chronicle" of 24th December in that year.

"The other day," says he, "we received from Mr Veitch branches and cones of a most remarkable coniferous tree, also Californian seeds, and a living specimen of which had just been brought him by his excellent collector, Mr William Lobb, who, we are happy to say, has returned loaded with fine things."

Mr Matthew's son, however, had, six months previously, written to his father, informing him of the discovery of the giant trees, and forwarding a sketch of some of them, a small branch, and some of its seeds. His letter was dated 10th July 1853, and was received, along with the seeds, on the 28th of August following. The letter was published *in extenso* in the "Gardeners' Chronicle" in the following year, 23d June 1854 (p. 373). It contains little but an account of one or two of the larger trees, the details of which we have already given, but specially mentions the accompanying parcel of seeds. On receipt of the seeds, Mr Matthew, in order to multiply the chances of their success, divided them into three portions, one of which he retained, one was given to Dr John Lyall of Newburgh, and the other to Mr Duncan, then gardener at Megginch Castle. All succeeded well; and a considerable number of plants were distributed among nurserymen and others, of which we have been able to trace eleven, and are indebted to their present growers for their dimensions, the particulars of which will be found under the head of "*Culture.*"

Mr Lobb's supply of seeds, however, was that which truly established the tree in this country. Its renown soon spread far and near; and by the time Mr Veitch had his young plants ready for distribution, every one was eager to possess it, and willing to pay a good price for it. Mr Veitch thus deservedly made a little fortune out of the *Wellingtonia.*

Next year, 1854, our neighbours across the Channel had their wants supplied by M. Boursier de la Riviere, who then transmitted a quantity of seeds to France. We may here mention that, in the year following, Mr Lawson of Borthwick Hall sent a water-colour drawing of the tree, from an original sketch, together with a branch and cone, to the Paris Universal Exposition, where it was exhibited with the Board of Trade collection, prepared by him, and attracted considerable attention. This drawing he subsequently presented to the Crystal Palace, where it remained, attached to the section of the big tree in the tropical department, until it shared the fate of its original in the fire already alluded to.

Subsequent consignments have been made from time to time, one of which, viz., that made by Mr Black, was the produce of the Expedition in which four trees in the Mariposa Grove were cut down to get at the cones, as previously described. At that time shooting them down by a rifle bullet, or cutting down the trees, seem to have been the only means of obtaining them, or at any rate the only means of doing so which had occurred to the earlier explorers; but now it is found that squirrels manage the business better. They cut off cones, and drop them in great numbers for food, and by visiting the trees often a plentiful supply may be picked up from the ground. It is not improbable that this did not occur in former times; for we know that, in the depth of the untrodden forest, animal life is rare. It is probably only since man has let in the cheerful light upon the surroundings of these groves that the squirrels have congregated about them, and made themselves so useful.

By this means, at any rate, a moderate supply of seeds has of late years been obtained and sent to this country pretty regularly, and the plant is no longer rare or high-priced. The trees have, moreover, as above mentioned, begun to bear fruit in Britain: at Thetford, Redleaf, Drinkstone Park, Bicton, and a multitude of other places in England; at Castle Martyr in Ireland; and at Tillichewan Castle and North Berwick House in Scotland. We shall, therefore, soon be independent of seed from California.

*Properties and Uses.*—We have already explained that these are yet to seek. That the bark of the *Wellingtonia* will prove a valuable substitute for oak bark for tanning we fully expect. It will be more difficult to find a use for the soft, light, and fragile timber, although even it too may be found sufficiently charged with tannin to be useful for the same purpose; but if it should not, we need not despair. The ease with which it can be cut may perhaps adapt it for making models to be afterwards stereotyped; or, after being carved, it may be possible to infiltrate and harden it so as to combine the advantages of easy workmanship with manufactured durability. In the meantime, its chiefest attraction in this country is its interest and beauty, and its most advantageous property, its rapidity of growth.

The wood is remarkable for its slow decay. This is the report of Mr Lapham and others who have seen it in California, and is fully confirmed by the accounts we have of the state of the fallen trees there.

Mr Marsh, in his work intitled "Man and Nature," suggests that birds do not seem to like the *Thujas*, or strong-smelling Cypresses, as he had never observed any to settle on *Thuja occidentalis*, &c. This is certainly not the case with *Wellingtonia*, whatever it may be with the *Thujas*. Mr Powell, of

Drinkstone Park, informs us that he had seen a blackbird's nest in a *Wellingtonia*, and a linnet's in a *Thujopsis*.

*Culture, Soil, and Propagation.*—The geological formation of the district in which the *Wellingtonias* occur is granitic. Dr C. F. Winslow, in the "Californian Farmer" (8th August 1854), says, that at Calaveros they are enclosed in a basin of coarse siliceous material, surrounded by a sloping ridge of sienitic rock, which in some places projects above the soil. The basin is reeking with moisture, and in the lowest places the water is standing, and some of the largest trees dip their roots into the pools or water-runs. The soil in which they grow is rich and deep, and if composed, as it probably is, of the decayed remains of former giants of the same breed, it is no wonder that it is so. Mr Blake alludes to this in one of the extracts which we have quoted from his paper; and Mr Matthew, in his letter to his father, above alluded to, says, "The whole surface of the ground (at Calaveros Grove) is strewed with immense trunks, in many instances covered with vegetation, so as to look like green earthen mounds; and only by cutting into them one finds that they are composed of rotten wood."

The climate at the Calaveros Grove is good, neither very hot nor very cold, and not dissimilar to our own. "In this upland region," says Mr Thomas Bannister ("Gardeners' Chronicle," 1855, p. 838), "the air is very fine, and the water most pure and cold; and, after suffering from the excessive heat at Murphy's and lower down among the southern gold regions, you most reluctantly descend. The wild fruits were not ripe; but in the season there are, I was told, strawberries, plums, and other fruits in great abundance, very good of their kind. There is fine food for cattle." Mr Matthew, in his letter, says, "Amongst the under-brush are hazel, rasp, currant, gooseberry, dogwood, poplar, and willow, with a number of shrubs which you do not have in Europe, one of them the *Rhus toxodendron*, or poison vine." The climate of the Mariposa Grove is described by Mr Blake as very similar to that of the Calaveros Grove. In summer it is warm and dry. In winter the snow falls, and rests about six feet deep, but nearly all disappears by the 1st of May. Rain seldom falls, and he ascribes to this the great depth of soil which hides the rocks. The snow melts gradually, and runs off without cutting the ground. At the Calaveros Grove the ground appears to be lower, and much more wet, during the summer, than at the Mariposa; and at the latter the trees are more widely spread on the slopes and high knobs of ground, where there is good drainage.

As might be expected, therefore, the climate of this country is perfectly suited to it. When it first came, it was kept by some in flower-pots, and under glass. The consequence was, that the plants so treated often became unhealthy and died, unless removed into the open air. It is now universally recognised as perfectly adapted to the climate of Britain. Merely to say that it is quite hardy in this country feebly expresses the trust that may be placed on it in this respect. It stood the severe winter of 1860-61, and also the present (1866-67), in most places without being in the slightest degree touched, even where plants previously thought hardy were killed by the frost. Of it scarcely a plant was killed, and only a very few injured, and testimony to its perfect hardiness has poured in from all quarters.

Mr Palmer's tables give the following results derived from 122 places, taken indiscriminately, viz.:—

| Places at which Plants were | Killed. | Much injured. | Injured. | Not injured. | Total. |
|---|---|---|---|---|---|
| England .............. | 3 | 6 | 15 | 60 | 84 |
| Scotland .............. | 1 | 1 | 4 | 29 | 35 |
| Ireland .................. | ... | ... | ... | 3 | 3 |
| | 4 | 7 | 19 | 92 | 122 |

It thus appears that out of 122 places, deaths occurred at only four, and on inquiry we find that at two of these the deaths were not due to the weather, but to the plants. One, for example, was killed at Sudbrooke Holme, in Lincolnshire, and it is said to have been "a poor sickly plant, 1½ feet high. It was planted out the previous year in a low, wet, and exposed situation, and had never done well. The cause of death was the wet." Of another, which was killed at Ashford Hall, Cheshire, we are told that it "had been in a pot the year previous to its being killed, in consequence of which it no doubt was not so hardy as it would otherwise have been. It was only 2 feet high, and was the only specimen here." These instances, therefore, can have no bearing upon the hardiness of this species. But there remain two other places where several plants were killed in the winter of 1860-61, which seem to reveal to us the limit of its endurance of cold, especially when combined with wet. They are certainly both within its bounds, but perhaps not far from the dividing line. One of these places is the Cairnies, in Perthshire, the property of Mr George Patton, the Lord Advocate of Scotland (after whom *Abies Pattoniana* is named). It is situated on one of the southern ranges of the Grampian Hills, at 600 feet above the level of the sea, and the soil where the plants grew was poor and shallow, with an impervious till for the subsoil. Mr Paterson, the gardener, writing in July 1863, says, "Our *Wellingtonias* are all small; some of them are in quite sheltered places; others are more exposed. Those most exposed suffered the most, other things being equal; some were only browned; others were killed or hurt so much that they have never fairly recovered. In the latter case, the soil was shallow, and the subsoil so hard, that the surface water could not sink away freely." We here see that wet again was one of the elements which contributed to the fatal result. The lowest temperature to which the plants at the Cairnies were subjected during the winter in which they were killed, was 4° below zero; a degree of cold which, although no doubt great, was exceeded at various other places where the *Wellingtonias* were not hurt.

The other place where plants were killed was Basing Park, Hampshire. With regard to it, Mr Duncan, writing in February 1863, says, "The situation of Basing Park is a very elevated one, and forms a series of hills. The valleys between these are cold, and the currents of air are very destructive to trees, more so, I believe, than the frosts, unless indeed it be the late spring frosts. In one of such sites, I planted some six years since three specimens of *Wellingtonia*. They had grown to the height of nearly four feet, when they were killed in 1860-61. Larch, which had been planted twenty-five years, were also completely destroyed in these valleys." We may, therefore, reasonably regard the fatal cases at Basing Park as exceptional.

The degree of cold was not known at all the places included in Mr Palmer's tables, but it was known at 105 out of the 122 reported on. At 60 of the 105 the greatest cold in the winter of 1860-61 did not fall below zero; at 45 of them it did, falling at Castle Newe, in Aberdeenshire, as low as 19° below zero; at Saffron Walden, in Essex, as low as 14° below zero; and at Chatsworth, and more than one place in that part of England, as low as 12° below zero; and reaching all the lesser degrees in various other parts of the country. In other words, there were rather more places reported on where the cold did not reach zero, than where it did, the proportion being as 4 to 3.

Now, the *Wellingtonias* were uninjured at 51 places where the cold did not reach zero, as against 31 where it did, giving a proportion of 5 to 3. The places where they were injured shew the influence of the cold even more strongly. Of those at which they were simply injured, but not seriously damaged, the proportion of places where the cold was above zero, and those where it was below zero, was nearly equal, being 8° above zero, to 7° below zero. But when we come to the instances in which the plants were *much* injured, the relative proportions are completely reversed. Then there is only one instance where the cold was not below zero. There were six cases of much injured, and at five of them the thermometer had reached respectively, 5°, 8°, 9°, 9°, and 11° below zero. In the two cases where the plants were killed, the cold in both was 4° below zero.

The tree seems to suffer more from the action of winds, however, than from cold. In the various notices of its growth and progress, which have from time to time appeared in the "Gardeners' Chronicle," and other horticultural periodicals, we constantly meet with such remarks as the following:—

"Becomes brownish under spring winds, but recovers;" "turns brown under severe winds;" "gets browned in foliage from effect of wind, but recovers." "Foliage becomes brown under exposure to wind, from which it recovers easily." "Browned by winds, not by frost." "Our best plant of *Wellingtonia* got as brown as a fox during the past winter." "No doubt much of the browning we have to complain of here is occasioned by the cold clay subsoil;" and so on.

Now, it is rather remarkable that its antipathy to wind should be declared thus early in its life. A fanciful person might say that nature, knowing that in very much exposed places it might from the fragility of its timber be snapped across as soon as it had made any progress, and before the bark was sufficiently thick to sustain it, thought it better to give it a constitution which would only allow it to grow in sheltered places, where it might endure to a good old age. There would thus be no waste, a thing which nature abhors as much as a vacuum.

Notwithstanding the evidence of its occasionally succumbing to extreme cold, the unwonted degree of it which it stood uninjured, as well as the rapidity with which it recovered from the effects of it, and the perfect success which has since attended it, sufficiently attest the suitableness of this tree to our climate. Although introduced only about 12 years, there are specimens in England which already exceed 20 feet in height. We shall specify its size at a few of the localities where it has thriven best, and reached the greatest size; and shall begin with the plants raised from the seed introduced by Mr Matthew. We might naturally expect that these should be the largest, but this is not the case, a circumstance probably due to their being all distributed in Scotland.

Of Mr Matthew's consignment, then, there are two growing at Gourdiehill, near Errol, in a cold situation, exposed to the north wind, and in a strong clayey soil; they measure about 8 feet each in height, and 14 inches in circumference of stem at the ground; both were much retarded in their early growth from having been kept too long in flower-pots.

There are two plants at Megginch Castle, by Errol. The one is now 13 feet high, 10 feet in diameter of branches, and the stem is 10 inches in diameter at its base. The other is 10 feet high, 8 feet in the diameter of its branches, and 10 inches in that of its stem. This last is by much the handsomest specimen, the other being disfigured from growing too close to other plants.

There are two plants at Ballendean, by Inchture, the first of which was planted out in 1859, in a hard yellowish earth, and now measures 10 feet in height, 18 feet in the circumference of its branches, and 18 inches in girth of stem at six inches from the ground. The other was planted in 1860, in a damp yellowish soil, and is growing faster, being now 13½ feet high, 18 feet in circumference of branches, and 15 inches in girth of stem.

There is one plant growing on a dry bank at Kinnoul Nursery, Perth, which has been frequently transplanted, and now measures only 5 feet in height. Another single plant grows in the garden of Dr John Lyall, Newburgh, who raised a third part of the seed for Mr Matthew. This is a fine specimen, 13½ feet high; circumference of branches, 34 feet; and of the stem at the ground, 3½ feet. It would have been much taller if it had not lost its top thrice, once by accident and twice by insects.

Another of the plants raised from Mr Matthew's seeds is at Balbirnie, Markinch, Fife. It was about 8 feet high in autumn 1860, with a stem 31 inches in girth at the ground, and about 32 feet in the circumference of its branches; but having been planted in a moist hollow, very subject to hoar frost, it was much cut down and injured in the succeeding winter, from which it has but recently commenced to recover, and is now only 5½ feet high.

Another at Inchry House, Fife, is 12 feet high, 23 inches in girth at the root, and about 23 feet in circumference round the extreme points of its branches; and the last of which we have heard is at Eglinton Castle, Ayrshire, but its dimensions we have not obtained.

It thus appears that the tallest plants, produced from the first arrival of seeds, are only 13½ feet high; while we shall immediately see that some of those reared from subsequent consignments have reached upwards of 20 feet.

The height of some of the best plants in England is as follows. They are chiefly taken from a valuable return published in the "Transactions of the Scottish Arboricultural Society," vol. iii. p. 58 (1865); and some of them are taken from measurements made two or three years ago. The most of the measurements were taken about 1864, but the supposed ages of the trees are given so far as known; and as the earliest importations of seed have been above specified, there can be little difficulty in fixing an approximate date to the measurements.

| | Height. Ft. | Height. In. | Supposed Years of Age. |
|---|---|---|---|
| At Windsor Castle there is a plant . | 21 | 0 | 10 |
| „ Do. one . | 13 | 0 | 10 |
| „ Bicton, Devonshire, . . . | 19 | 9 | 9 |
| „ Do. . . . . | 18 | 0 | 9 |
| ;, Goodwood Park, Sussex, . . | 18 | 0 | 11 |
| „ Watcome, . . . . | 18 | 0 | 7 |
| „ Murthly Castle, Perthshire, . . | 18 | 0 | — |
| „ Castle Martyr, Cork, . . . | 18 | 0 | 7 |
| „ Bagshot (Mr Waterer's Nursery), . | 18 | 6 | 10 |
| „ Redleaf, Kent, . . . | 17 | 2 | — |
| „ Elvaston, Derbyshire, . . | 16 | 6 | 11 |
| „ Tortworth Court, Gloucester, . | 16 | 0 | 11 |
| „ Fairlawn Park, Kent, . . | 16 | 0 | 8 |
| „ Rosehall, Stirling, . . . | 16 | 0 | 11 |
| „ Singleton, Carmarthen, . . | 15 | 6 | 8 |
| „ Bedgebury Park, Kent, . . | 15 | 1 | — |
| „ Highnam Court, Gloucester, . . | 15 | 0 | 11 |
| „ Bryanstone, Dorset, . . . | 15 | 0 | 11 |
| „ Fordell, Fife, . . . . | 15 | 0 | — |
| „ Cecil, Co. Tyrone, . . . | 15 | 0 | 10 |
| „ Lambton Castle, Durham, . . | 14 | 6 | 9 |
| „ Riccarton, Mid-Lothian, . . | 14 | 0 | 11 |
| „ Basing Park, Hants, . . . | 14 | 3 | 9 |

| | Height. Ft. | Height. In. | Supposed Years of Age. |
|---|---|---|---|
| At Bownnoe, Cornwall, . . . | 14 | 0 | 10 |
| „ Denbigh, . . . . | 14 | 0 | 10 |
| „ Eggesford, Devon, . . . | 14 | 0 | — |
| „ Kew, Surrey, . . . . | 14 | 0 | 10 |
| „ Halston Hall, Salop, . . . | 14 | 0 | 10 |
| „ Wellbeck Abbey, Nottingham, . | 14 | 0 | — |
| „ Ambleside, Westmoreland, . . | 14 | 0 | 8 |
| „ Castle Ashby, Northampton, . . | 13 | 0 | 8 |
| „ Taymouth Castle, Perth, . . | 13 | 0 | 11 |
| „ Glasslough, Co. Monaghan, . . | 13 | 0 | 13 |
| „ Borthwick Hall, Mid-Lothian, . | 14 | 4 | 11 |
| „ Dropmore, Buckingham, . . | 12 | 0 | 8 |
| „ Norcliffe, Chester, . . . | 12 | 0 | 8 |
| „ Rolleston Hall, Stafford, . . | 12 | 0 | 9 |
| „ Balgowan, Perth, . . . | 12 | 0 | 7 |
| „ Camperdown, Forfar, . . . | 12 | 0 | 11 |
| „ Greenock Cemetery, Renfrew, . | 12 | 0 | 10 |
| „ Castle Kennedy, Wigtown, . . | 12 | 0 | 9 |
| „ Somerville, Co. Meath, . . | 12 | 0 | 11 |
| „ Charlesfort, Co. Meath, . . | 12 | 0 | 5 |
| „ Biddulph Grange, Stafford, . . | 11 | 0 | 8 |
| „ Eastnor Castle, Hereford, . . | 11 | 0 | 6 |
| „ Osborne, Isle of Wight, . . | 11 | 0 | 11 |

So far as we can learn from the success which has attended it in these and other counties, there does not appear to be any great distinction in favour of one kind of district more than another. If we at times seem to fall upon facts from which we might hope to draw some general conclusion, others directly contradicting them presently warn us against hasty generalisation. For instance, Mr Rogers, writing from Cornwall, says, "The plant does not like our moist climate, and I scarcely know one thoroughly good specimen in this county." But Mr Dorrien, writing from Ashdean, Sussex, says, "I have three seedling plants now about 4 feet high, which have never suffered in the least from either cold or winds, *and I am much exposed to the sea-breezes.*" We have seen that it is apparently more susceptible to the effect of winds than frost, or other trying influences; but Mr Blackie, the gardener at Revesby Abbey, Lincolnshire, reports quite the reverse: "This does well everywhere," says he, "if exposed to all the winds; plants here do much better in open places than in sheltered. I am convinced that the reason of pieces dying off arises simply from want of air, at least ours has not a dead leaf; formerly, when more sheltered, pieces were often dying."

Notwithstanding this testimony we think the opposite opinions are better founded, as they are more numerous; and the two points which we recommend to be chiefly guarded against are, too great exposure, and a cold wet soil. Mr Kirby Hedges (Wallingford Castle) mentions an instructive illustration of the importance of a judicious location of this species. He says: "I recollect, in 1862, seeing some plants of the *Wellingtonia*, about 7 or 8 feet high, at Beauport, the late Sir Charles Lamb's place, near St Leonard's, which were so severely injured by the frost that there was little hope of their recovering; but they were growing, or rather existing, in low wet ground, and the wonder to me was, that they could have borne any shock at all. One of the finest specimens I ever saw was at this place; and it was quite uninjured, *growing, however, on the high ground.*"

The rapidity of the growth of these trees must not be passed over without notice, 2½ and 3 feet being common growths in a single year; but it sometimes happens that where the plant has escaped apparently unhurt from the severity of the preceding winter, or other unfavourable circumstances, its growth is retarded in the following year, its energies being employed in making up the loss which its stamina sustained, instead of adding to its size.

*Diseases.* — Soon after its introduction, complaints were frequent of its being subject to various diseases: one very common one was its shoots becoming sickly, and dying off, as is often the case with *Cryptomeria Japonica*, and *Dacrydium.* This was due principally, if not entirely, to the plants being over-coddled, kept under glass when they should have been in the open air, and retained in pots when they should have been planted out in the open ground. And although occasional sickly shoots do still now and then appear, the general complaint has ceased since the plants have become more common, and less attention is bestowed upon them.

Pot-cramping must be peculiarly prejudicial to such a plant as this. The larger a tree is to be, the more space and freedom for its roots should be given; and we know that, if the roots of a plant once acquire the spiral conglomeration which is the result of being packed in too small a pot, it is almost impossible to get them out of the set. There is a congeries of roots coiled up, which directs the line of growth of future roots, and the plant *never* thrives. It is impossible to speak too strongly of the evil done to forest trees by pot-cramping. One has often to submit to it, and the only alleviation (it is not always a remedy) is to see that the roots are carefully uncoiled, and spread out and laid down in a proper position, and so rammed or wadded into the right attitude, that they will not by-and-by gradually recoil back into their old posture. To quote the words of an intelligent practical horticulturist, Mr William Baxter, the gardener of Sir W. Gibson-Craig of Riccarton: " In purchasing plants in pots in nurseries, it invariably happens that the roots are much matted: to plant them in this state I have found to be an injudicious step; rather than this, shake every particle of soil from the roots, and spread them regularly out when planting. This causes the roots to spread wide, and consequently enables the trees to withstand a high wind. It is also a good practice to place a few rather heavy stones round the necks of the plants, which does away with staking." There is a tree growing in the Royal Horticultural Society's Garden at Chiswick, which well illustrates the advantage of this treatment. It arrived in a pot, and on being taken out of it, its roots were found to be thoroughly pot-cramped. The present intelligent superintendent of the Society's Chiswick Garden, Mr Barron, carefully uncoiled and spread out every one of the roots, much to the surprise of some of his men, who predicted that it would not survive such rough treatment: for it may reasonably be supposed that there is no uncoiling of a conglomerated mass of intertwined roots without some damage being done to them. The result, however, has justified his procedure. For two or three years it made little progress, but at last it started. Last year (1866) it grew 3 feet, and this year it promises to do as much. It was planted in 1861, and is already between 9 and 10 feet in height, and is as fine and handsome a well-proportioned plant as any one could wish to see; not unlike fig. 38 (page 24), which is a very characteristic representation of a well-grown seedling.

Another disease which we saw at first, but which we have not noticed for some years, was a thickening of some of the branches at the base of the year's shoots, enlarging it and the neighbouring branches into an unsightly, swollen, diseased-looking mass. We never ascertained the true history of this complaint. At first we were inclined to refer it to an insect; and even yet that still strikes us as the most plausible explanation; but on examination of the place we failed to detect any insect, either outside or inside the diseased part. The complaint, too, seemed to extend generally over all the *Wellingtonias* in the same district. It did not last long, however, and had no permanent bad effect upon the trees.

This has of late years been the favourite tree selected to be planted as a memorial by the Queen, and those whom the nation delights to honour. It has been so selected, of course, from the feeling that its great size and long life will make it a prominent and enduring monument; and equally, of course, it has been chiefly in the neighbourhood of great cities that these memorial trees have been planted, these being the places where memorials are desired. Two young *Wellingtonias* were planted in 1861, the one by the Queen, and the other by Prince Albert, in the Royal Horticultural Society's Garden at South Kensington. One has been lately planted by her Majesty at Oxford, and others at various other cities. But a worse choice could scarcely have been made. As a rule, Conifers have a special antipathy to smoke, and an absolute necessity for pure air, the stifling atmosphere of the crowded city being death to them. The *Wellingtonias* are no exception to the general rule. In a very few years not one of the much-prized Victoria- and Albert-planted *Wellingtonias* will remain. The two at the Royal Horticultural Society's Garden, at South Kensington, are rapidly deteriorating; the foliage has become thin, and the trees unhealthy-looking. There are only two years' leaves upon them, and as each year's growth has not exceeded half-a-foot, the reader can imagine how bare the trees have become. How many years may have to elapse before they expire, we cannot tell, but shall be agreeably surprised if it exceed half-a-dozen. The soot of the London atmosphere has deprived them of the freshness of their green. They are as black as the funereal Yew; and this is not wholly due to the dust and soot deposited on them. The soot seems to impart (as it does to the grass around) some of its own colour intrinsically to the foliage, making it darker and blacker, and in summer forming a harsh and disagreeable contrast with the fresh pea-green of the young shoots.

*Cultivation.*—The seeds, as already said, are like small scales, the cotyledons lying longitudinally in the middle. It requires some skill to know at a glance whether they are really ripe or not, but this can soon be found out by chewing them; the want of substance in the unripe cotyledons then shewing itself. They germinate in about three weeks, when they are placed in a hot-house, or in frames where there is some heat. The young plants, on pushing their way up out of the earth, have their young bark of a brick-red or violaceous colour, and this continues during the whole of the first year.

The young plants are very apt to damp off, unless allowed plenty of light and air; and their young shoots and branches are also more liable than those of other Conifers to do so in close, moist weather, especially when deprived of a free circulation of air. This tendency continues even after they are picked out and planted in the open ground. Mr Westland, the gardener at Kingston Hall, Nottinghamshire, says, "I saw a large plant of *Wellingtonia* killed at Thrumpton Hall, near here, which they stated was injured by the frost. Now, I doubted that, as I have seen hundreds of plants, from 1 foot to 18 inches high, go off in nurseries without apparently any cause; but I always considered that it was pot cultivation that caused it, and at that time they kept them in frames and under glass to forward their growth."

Young plants are reared with great ease and readiness from cuttings; and, what is most important, in the great majority of cases, they grow erect and readily form leaders. Indeed, to any but a nurseryman's eye, it would often be difficult to distinguish between a seedling and a plant from a cutting of the same size. Should any of our readers wish to be knowing on the subject, we would recommend them to compare the spread of the lower branches in the one with that in the other. It is *not* the cutting which usually has them broadest; but even this is a fallible test, depending greatly upon the kind of slip out of which the young plant has been made.

No stronger illustration of its willow-like readiness to grow can be given than the fact, which we have ourselves observed, of a young cone which had been plucked, and hung upside down in a phial of water (for the purpose of macerating and rotting off the chlorophyll, so as to make a skeleton of the ligneous core), actually sending out a rootlet from the axis at the apex of the cone. A seed or a plant put in the ground upside down, will push its shoot round so as to make its way back again above ground; it is its leaves and buds, however, which so make their way through the earth to upper air; but here it was not a shoot, a bud, or a leaf, which was pushed forward from the axis of the cone, but actually a rootlet. We never saw any similar case, nor do we remember ever to have met with an account of one.

The tenacity of life of the *Wellingtonia* is not more remarkable than its readiness to propagate by cuttings. The two are doubtless different phases of the same quality. The "Mother of the Forest," already mentioned as having been stripped of its bark to the height of 116 feet, is still flourishing. Beside her lies her murdered lord, the "Father of the Forest," who, we are told, put forth several young shoots after he had been felled for some time; and there are a few of her descendants standing around her in which great cavities (one as large as 17 feet across and 40 feet high) have been burnt, and yet the trees do not seem to have suffered.

As might be expected from a tree possessing these properties, young plants bear transplanting well. We have seen plants of 6 and 8 feet high transplanted without shewing the smallest indication that they were aware of the removal; and we see no reason why much larger trees should not be removed with equal success. The root forms a large thick bushy ball.

*Commercial Statistics.*—In 1854, seedlings of 9 inches were sold at 10s. 6d., and from 15 to 18 inches at 21s. In 1858, the price of 4-inch seedlings was 5s.; 12 to 15 inches, 10s. 6d. to 15s.; 18 to 24 inches, 21s. to 42s. In 1862, the price of 1-year seedlings was 1s. 6d.; plants from 18 to 24 inches, 10s. 6d.; good specimens of 3 to 4 feet, 42s.; and very fine plants, £10, 10s. The prices in the present year (1867) are as follows: plants 6 to 9 inches, 1s.; 12 to 18 inches, 1s. 6d. to 2s. 6d.; 18 to 24 inches, 3s. 6d. to 5s.; 3 to 4 feet, 7s. 6d. to 15s.; 4 to 6 feet, 21s. to 63s.; 6 to 8 feet, 84s. to 105s. The current prices of seeds is 1s. 6d. per 100, or 12s. per 1000.

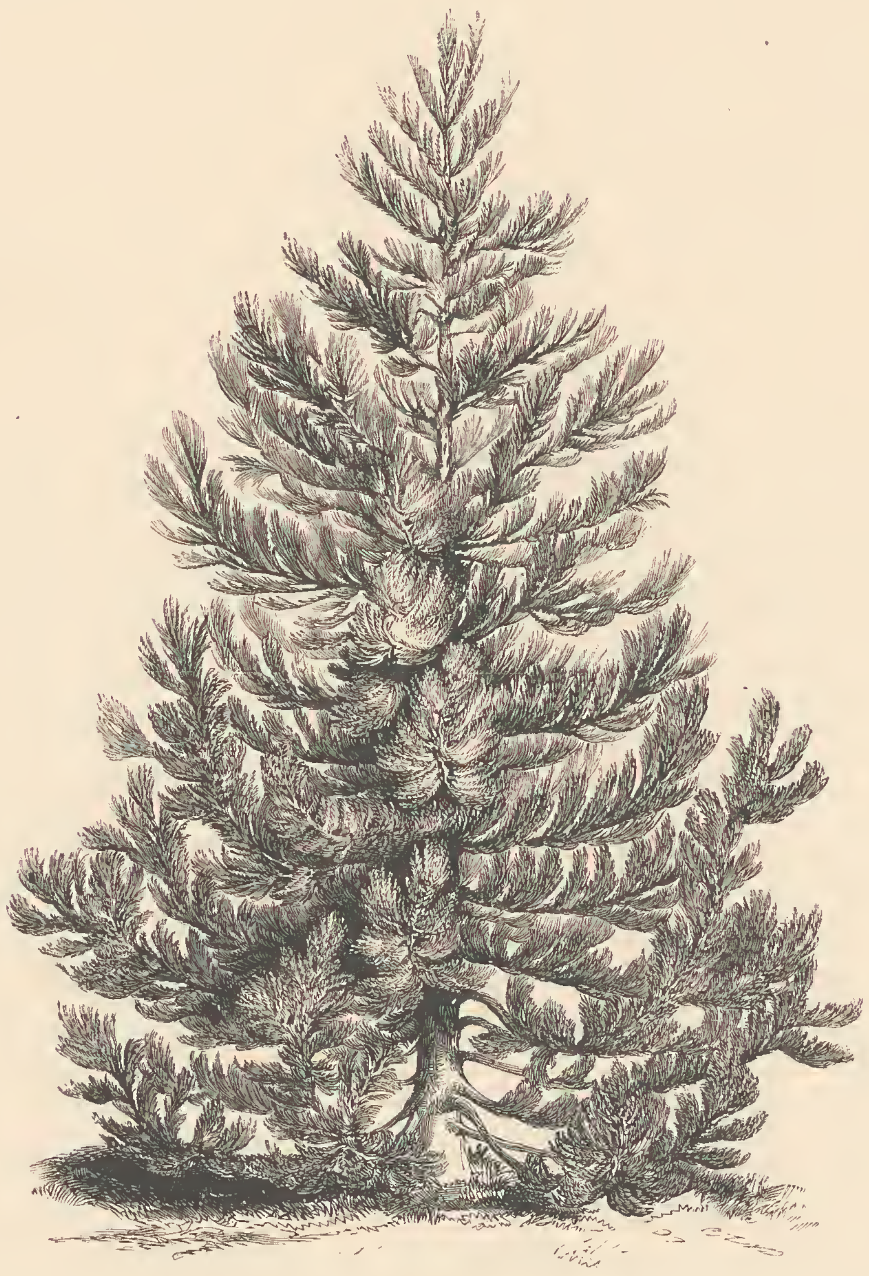

Fig. 38. A Seedling Plant sown in 1856 at Bangholm Nursery, Edinburgh. Height (in 1866), 10 feet 6 inches..

# SEEDS OF CONIFEROUS TREES

As most lovers of Coniferæ take an interest in raising plants from seed, we think it may prove useful to give a list of those kinds which are to be procured in the ordinary way of trade. This list has been prepared by Messrs. Vilmorin-Andrieux & Co., of Paris, the well-known seed-growers, whose house may be described as the main source from whence nurserymen in all parts of the world draw their supplies. Messrs. Vilmorin have special collectors in every country, whose business it is to collect the seeds and forward them to Paris. The eminence which this house has attained for the purity and "true" quality of its seeds, affords a sufficient guaranty to the purchaser.

The following list contains those kinds of seeds only of which the supply is constant, except in those years when the crop is a failure. On special application, however, we understand that seeds of nearly all the species described in this work will be procured if in any way possible.

The names to which an asterisk (*) is prefixed indicate those which are rare, and of which the supply is limited.

ABIES, *Linnæus*
- alba
- Albertiana (Tsuga Mertensiana)
- *Alcoquiana
- *Brunoniana
- Canadensis
- cœrulea
- concolor
- Douglasii
- ,, macrocarpa
- *Engelmannii (A. commutata)
- excelsa
- *Hookeriana (A. Williamsonii)
- *Jezoensis
- Menziesii
- *Morinda (A. Smithiana. Pinus Khutrow)
- nigra
- *obovata
- ,, Schrenkiana
- Orientalis
- Pattoniana
- *Polita
- rubra
- *Sieboldii (Tsuga Sieboldii)
- subalpina Fallax
- *Williamsonii (A. Hookeriana)

ARAUCARIA, *Jussieu*
- *Bidwillii
- Brasiliensis
- *Cookii
- excelsa
- imbricata

CEDRUS, *Link*
- Atlantica argentea
- Deodara
- Libani

CEPHALOTAXUS, *Siebold*
- drupacea
- Fortunei
- pedunculata
- tardiva (Taxus adpressa)

CRYPTOMERIA, *Don*
- elegans
- Japonica
- Lobbii
- pungens
- spiralis falcata
- viridis

CUNNINGHAMIA, *R. Brown*
- Sinensis
- ,, glauca

CUPRESSUS, *Tournefort*
- elegans (C. thurifera)
- expansa Bedfordiana
- fragrans
- funebris
- Goveniana
- gracilis (C. torulosa gracilis)
- horizontalis
- ,, pendula
- Lawsoniana
- ,, elegans
- Lusitanica (C. Sinensis)
- MacNabiana
- macrocarpa (C. Lambertiana)
- majestica (C. torulosa majestica)
- Nutkaensis (Thujopsis borealis. Chamæcyparis Nutkaënsis)
- pendula glauca
- sempervirens pyramidalis
- thujoides
- torulosa
- ,, *of Cashmeer
- Tournefortii

DACRYDIUM, *Solander*
- *cupressinum
- *Franklinii

FRENELA, *Mirbel*
- Australis
- *crassivalvis
- *fruticosa
- *Gunnii
- *Hugelii
- *pyramidalis
- *rhomboidea
- *robusta
- *Roei
- triquetra
- *verrucosa

GLYPTOSTROBUS, *Endlicher*
- *heterophyllus

JUNIPERUS, *Linnæus*
- Bermudiana
- Californica Utahensis
- communis
- *drupacea
- excelsa
- *Japonica
- Lycia
- macrocarpa
- occidentalis
- Oxycedrus
- Phœnicea
- prostrata
- *rufescens
- Sabina
- Suecica
- *tetragona
- *turbinata
- Virginiana
- ,, cinerascens

LARIX, *Link*
- Dahurica
- Europæa
  - ,, pendula
  - ,, rossica
- *leptolepis (L. Japonica)
- microcarpa (L. Americana)
- *occidentalis
- *Pseudo-Larix Kæmpferi
- Sibirica

PICEA, *Don*
- amabilis (Abies lasiocarpa)
- Apollinis
  - ,, *Reginæ Amaliæ
- balsamea
- bracteata
- Cephalonica
- Cilicica
- firma (Abies bifida)
- Fraseri
- grandis (Abies Gordoniana)
- magnifica
- nobilis
- Nordmanniana
- Numidica (Abies Baborensis)
- pectinata (P. taxifolia)
- Pichta
- Pindrow
- Pinsapo
- religiosa
- Webbiana (Abies spectabilis)

PINUS, *Linnæus*
- *albicaulis
- *aristata
- Austriaca (P. nigra)
- *Balfouriana
- *Banksiana
- Benthamiana
- *Bolanderi
- Brutia
- Canariensis
- Cembra
- contorta
- Coulteri
- *densiflora
- edulis
- excelsa
- flexilis
- *Gerardiana
- Halepensis
- inops
- insignis

PINUS—*continued.*
- Jeffreyii
- *Koraiensis
- Lambertiana
- Laricio Corsica
  - ,, Calabrica
- Llaveana
- longifolia
- *Mandshurica (P. Cembra pygmea)
- Pinaster (P. maritima)
  - ,, de Corte (P. Hamiltonii)
  - ,, of the Landes (P. maritime of Bordeaux)
- *Massoniana
- mitis
- monophylla (P. Fremontiana)
- montana
- *Montezumæ
- monticola
- muricata
- palustris (P. Australis)
- Parryana
- parviflora
- *patula macrocarpa
- *Peuce
- Pinea
  - ,, fragilis
- pungens
- ponderosa
- Pseudo-Halepensis
- *Pyrenaica (P. Halepensis Salzmannii)
- rigida
- resinosa (P. rubra)
- *Russelliana
- Sabiniana (Nut Pine)
- *serotina
- *Sinensis
- Strobus
- Sylvestris
  - ,, *argentea
  - ,, Rigaensis
- Taurica
- Tæda
- Torreyana
- tuberculata

RETINOSPORA, *Siebold*
- filifera
- obtusa
- pisifera
- *plumosa
- squarrosa

SALISBURIA, *Smith*
- adiantifolia (Ginkgo biloba)

SCIADOPITYS, *Siebold*
- *verticillata

SEQUOIA, *Endlicher*
- Wellingtonia (Wellingtonia gigantea)

TAXODIUM, *Richard*
- distichum (Cupressa disticha)
- mucronatum
- sempervirens (Sequoia sempervirens)

TAXUS, *Linnæus*
- baccata
  - * ,, fructu-luteo
- *brevifolia (T. occidentalis)
- Canadensis
- Hibernica
- *Lindleyana
- *Nepalensis

THUJA, *Linnæus*
- articulata (Callitris quadrivalvis)
- Craigana (Libocedrus decurrens)
- *cupressoides
- filiformis
- Lobbii (T. Menziesii. T. gigantea)
- Nepalensis
- occidentalis (White Cedar)
  - ,, pendula
  - ,, *Vervaeneana
  - ,, Wareana (T. Tatarica)
- orientalis
  - ,, aurea
  - ,, hybrida
  - ,, nana (compacta)
- plicata
- Tatarica

THUJOPSIS, *Siebold*
- dolabrata
  - ,, foliis variegata

TORREYA, *Arnott*
- Californica

WIDDRINGTONIA, *Endlicher*
- cupressoides
- juniperoides

The specialty of the firm of Vilmorin-Andrieux & Co. is garden seeds, and of these enormous quantities are grown, and they have also a world-wide reputation for the seeds of natural grasses of the finer kinds.

The address of the firm is No. 4 Quai de la Mégisserie, Paris, and the London house is No. 24 Mark Lane, near the Corn Exchange.

# PRICES OF CONIFEROUS TREES

Following the plan of Loudon when completing his large work, the "Arboretum Britannicum," a circular letter was addressed to upwards of one hundred of the principal nurserymen in Europe, inviting them to send for insertion in the "Pinetum Britannicum" copies of their Price Lists of Coniferæ, the object being to shew the variation of prices in different parts of this country and the Continent. To this only one response has been made—viz., from the Lawson Seed and Nursery Company, to whom we are indebted for the following list. This firm succeeded, a few years ago, to the business carried on for nearly a century by Peter Lawson & Son of Edinburgh, whose Price List forms one of the five published in 1838 in the Appendix to Loudon's "Arboretum."

A comparison of this list with those of other nurserymen, obtained from independent sources, conveys a sufficiently accurate idea of prices in the present year, 1884. The nomenclature followed is not in all respects that adopted in the "Pinetum Britannicum," but is sufficiently accurate for practical purposes.

## *I.—ORNAMENTAL CONIFEROUS TREES AND SHRUBS*

| | | Each—*s.* | *d.* |
|---|---|---|---|
| ABIES, Spruce— | | | |
| alba. *See* White American Spruce. | | | |
| argentea | 2/6 to | 5 | 0 |
| glauca | | 2 | 6 |
| Maxwellii | 3/6 to | 5 | 0 |
| nana | | 2 | 6 |
| variegata | | 2 | 6 |
| Albertiana, 12 to 18 inches | | 1 | 6 |
| Alcoquiana | 2/6 to | 10 | 6 |
| Bridgesii | | 1 | 6 |
| Brunoniana | | 2 | 6 |
| canadensis, 2 to 3 feet | 1/ to | 2 | 6 |
| alba spica | 2/6 to | 5 | 0 |
| Douglasii, 1 year seedlings, | per 1000 30/ | | |
| 6 to 9 inches | per 100 10/ | | |
| 9 to 12 inches | „ 21/ | | |
| 18 to 24 inches | „ 50/ | | |
| 2 to 3 feet | 1/6 to | 2 | 6 |
| 3 to 4 feet | 2/6 to | 3 | 6 |
| glauca, 9 to 12 inches | | 1 | 0 |
| Stairii | 2/6 to | 5 | 0 |
| taxifolia | 1/ to | 2 | 6 |
| Engelmanii | 2/6 to | 10 | 6 |
| excelsa. *See* Norway Spruce. | | | |
| aurea variegata | 2/6 to | 7 | 6 |
| Clanbrasiliana | 1/6 to | 3 | 6 |
| Cranstonii | 2/6 to | 5 | 0 |
| echinæformis | 1/6 to | 3 | 6 |
| elegans | 2/6 to | 3 | 6 |
| Finedonensis | 1/6 to | 2 | 6 |
| glauca | | 2 | 6 |
| Gregoriana | 1/6 to | 5 | 0 |
| inverta | 1/6 to | 5 | 0 |
| monstrosa, 1 to 2 feet | | 2 | 6 |
| 5 to 6 feet | | 7 | 6 |
| mucronata, 12 to 18 inches | | 2 | 6 |
| pendula, 18 to 24 inches | | 2 | 6 |
| Perthensis | | 2 | 6 |
| pygmæa, 6 to 12 inches | 1/6 to | 3 | 6 |
| pyramidalis, 6 to 12 inches | | 1 | 6 |
| 1½ to 2 feet | | 2 | 6 |
| 3 to 4 feet | | 3 | 6 |
| Remontii | 2/6 to | 5 | 0 |
| rubra, 18 to 24 inches | | 1 | 6 |
| stricta, 1 to 2 feet | | 2 | 6 |
| 2 to 3 feet | 3/6 to | 5 | 0 |
| tenuifolia, 9 to 12 inches | | 3 | 6 |
| variegata | | 2 | 6 |
| firma. *See* Picea bifida. | | | |
| Hanburyana | 1/6 to | 2 | 6 |
| Hookeriana, 6 to 9 inches | | 2 | 6 |
| 12 to 18 inches | 2/6 to | 3 | 6 |
| Maximowiczii | 1/ to | 2 | 6 |
| Menziesii, 2 to 3 feet | | 2 | 6 |
| 3 to 4 feet | 3/6 to | 5 | 0 |
| 4 to 6 feet | 5/ to | 7 | 6 |
| nigra. *See* Black American Spruce. | | | |
| glauca | | 2 | 6 |
| obovata | 1/6 to | 3 | 6 |
| orientalis, 18 to 30 inches | | 2 | 6 |
| 2 to 3 feet | 2/6 to | 3 | 6 |
| 3 to 4 feet | 7/6 to | 21 | 0 |
| Parryana *(true)*, 1 to 2 feet | 2/6 to | 5 | 0 |
| Pattoniana, 6 to 9 inches | | 1 | 0 |
| 9 to 12 inches | 1/6 to | 2 | 6 |
| 12 to 18 inches | 2/6 to | 5 | 0 |
| polita | 2/6 to | 7 | 6 |
| rubra | 1/6 to | 2 | 6 |
| Smithiana. (*Syn.*—A. Khutrow, A. Morinda, &c.) | | | |
| 12 to 15 inches | 1/6 to | 2 | 6 |
| 2 to 4 feet | 2/6 to | 7 | 6 |
| variegata | | 3 | 6 |
| ARAUCARIA Braziliensis | 3/6 to | 7 | 6 |
| Cookii | 5/ to | 10 | 6 |
| Cunninghamii, 1 to 3 feet | 15/ to | 42 | 0 |
| excelsa, 1 to 3 feet | 10/6 to | 42 | 0 |
| glauca | 21/ to | 105 | 0 |
| Goldieana | 21/ to | 31 | 6 |
| imbricata, 2 years seedlings, *(fine)*, | per doz. 9/ | | |
| ARAUCARIA, *continued*— | | | |
| imbricata, 6 to 9 inches | | 2 | 6 |
| 12 to 18 inches | | 3 | 6 |
| 2 to 3 feet | 7/6 to | 15 | 0 |
| tenue, 6 to 9 inches | | 7 | 6 |
| Ruleii | | 10 | 6 |
| ARTHROTAXIS— | | | |
| cupressoides | 3/6 to | 5 | 0 |
| imbricata | 3/6 to | 5 | 0 |
| selaginoides | 3/6 to | 5 | 0 |
| BIOTA. Chinese Arborvitæ— (*See also* Thuja.) | | | |
| Fortunei | 1/6 to | 2 | 6 |
| flagelliformis | | 2 | 6 |
| japonica pendula | | 5 | 0 |
| meldensis, 1 to 2 feet | 1/6 to | 2 | 6 |
| orientalis *(Chinese Arborvitæ)*— | | | |
| 6 to 9 inches | per 100 21/ | | |
| 9 to 12 inches | „ 30/ | | |
| 18 to 24 inches | per doz. 12/ | | |
| aurea | 1/ to | 5 | 0 |
| argentea variegata, 9 to 12 in., in pots | | 2 | 6 |
| elegantissima, 6 to 12 in. | 1/6 to | 3 | 6 |
| picta *(new)* | 2/6 to | 5 | 0 |
| conica, 12 to 18 inches | 2/6 to | 3 | 6 |
| 18 to 24 inches | 3/6 to | 5 | 0 |
| 2 to 3 feet | 5/ to | 7 | 6 |
| falcata | | 2 | 6 |
| Freneloides | | 2 | 6 |
| globosa, 6 to 12 inches | 1/ to | 2 | 6 |
| 12 to 18 inches | 2/6 to | 3 | 6 |
| glauca, 6 to 9 inches | 1/6 to | 2 | 6 |
| gracilis, 12 to 24 inches | 1/6 to | 2 | 6 |
| nana, 6 to 12 inches | | 1 | 0 |
| nepalensis, 9 to 12 inches | | 1 | 0 |
| 12 to 18 inches | 1/6 to | 2 | 6 |
| picta argentea | | 2 | 6 |
| pyramidalis, 6 to 9 inches, | per doz. 6/ | | |
| 2 to 3 feet | 2/6 to | 3 | 6 |
| variegata | | 2 | 6 |
| pygmæa | 2/6 to | 5 | 0 |
| semper-aurescens | 1/6 to | 5 | 0 |
| Sieboldii | 1/6 to | 5 | 0 |
| tortuosa | 1/6 to | 2 | 6 |
| variegata aurea, 1 to 2 ft. | 1/6 to | 3 | 6 |
| pendula | 1/ to | 10 | 6 |
| Tartarica *(Sibirica)*, 9 inches | | 1 | 6 |
| 18 to 24 inches | | 2 | 6 |
| 2 to 4 feet | 3/6 to | 7 | 6 |
| triangularis | | 2 | 6 |
| CALLITRIS— | | | |
| cupressoides | 1/6 to | 3 | 6 |
| quadrivalvis | 1/6 to | 3 | 6 |
| CEDRUS. Cedar— | | | |
| atlantica, 9 to 12 in. | per 100 35/ | | |
| 12 to 18 inches | „ 50/ | | |
| 2 to 3 feet | 1/6 to | 3 | 6 |
| argentea variegata | 5/ to | 10 | 6 |
| glauca *(new)* | 5/ to | 10 | 6 |
| Deodara, 6 to 9 inches, | per doz. 12/ | | |
| 12 to 18 inches | „ 18/ | | |
| 18 to 24 inches | 2/6 to | 3 | 6 |
| 2 to 3 feet *(fine)* | 5/ to | 7 | 6 |
| crassifolia, 6 to 12 inches | 3/6 to | 5 | 0 |
| robusta, 6 to 12 inches | 2/6 to | 5 | 0 |
| variegata, 6 to 12 inches | | 3 | 6 |
| 18 to 30 inches | 5/ to | 10 | 6 |
| viridis | 3/6 to | 5 | 0 |
| Libani, 1 to 2 feet | | 2 | 6 |
| CEPHALOTAXUS. Chinese Yew— | | | |
| drupacea | 1/ to | 2 | 6 |
| Fortunei | 1/6 to | 3 | 6 |
| Harringtonii | | 1 | 6 |
| CHAMÆCYPARIS. White Cedar— | | | |
| sphæroidea *(Thujoides)*, 9 to 12 inches | | 1 | 0 |
| viridis | | 1 | 0 |
| atrovirens, 12 to 18 inches | | 1 | 6 |
| 2 to 4 feet | 2/6 to | 3 | 6 |
| aurea *(new, fine)* | 5/ to | 7 | 6 |
| CHAMÆCYPARIS, *continued*— | | | |
| sphæroidea— | | | |
| glauca, 12 to 18 inches | 1/6 to | 2 | 6 |
| 2 to 4 feet | 3/6 to | 5 | 0 |
| variegata, 12 inches | 1/6 to | 2 | 6 |
| 18 to 24 inches | 2/6 to | 3 | 6 |
| thurifera | 1/6 to | 2 | 6 |
| CRYPTOMERIA. Chinese Cedar— | | | |
| elegans, 9 to 12 inches | | 1 | 0 |
| 12 to 18 inches | | 1 | 6 |
| 2 to 3 feet | | 2 | 6 |
| japonica, 9 to 12 inches | | 1 | 0 |
| 2 to 6 feet | 1/6 to | 7 | 6 |
| araucarioides, 6 to 12 in. | 1/6 to | 2 | 6 |
| 2 to 3 feet | 2/6 to | 3 | 6 |
| Lobbii, 12 to 18 inches | 1/6 to | 2 | 6 |
| 2 to 3 feet | 3/6 to | 7 | 6 |
| nana, 6 to 12 inches | 1/ to | 2 | 6 |
| spirale falcata | 2/6 to | 5 | 0 |
| CUNNINGHAMIA sinensis | 1/6 to | 2 | 6 |
| CUPRESSUS. Cypress— | | | |
| cashmeriana | 1/6 to | 2 | 6 |
| chinensis | | 2 | 6 |
| Corneyana | 1/6 to | 3 | 6 |
| elegans | 1/6 to | 3 | 6 |
| expansa | | 1 | 6 |
| fragrans, 18 to 24 inches | | 1 | 6 |
| 2 to 3 feet | | 2 | 6 |
| aurea | | 3 | 6 |
| funebris, 1 to 2 feet | 1/ to | 1 | 6 |
| Goveniana, 12 to 18 inches | | 1 | 0 |
| 18 to 24 inches | | 1 | 6 |
| gracilis | 2/6 to | 5 | 0 |
| Lambertiana *(true)*— | | | |
| 18 to 24 inches | 2/6 to | 3 | 6 |
| Lawsoniana— | | | |
| 12 to 18 inches | per 100 30/ | | |
| 18 to 24 in. | per 100 50/ to 60/ | | |
| 2 to 3 feet | per doz. 12/ | | |
| 3 to 4 feet | per doz. 18/ to 30/ | | |
| alba spica | 2/6 to | 7 | 6 |
| argentea | 1/6 to | 7 | 6 |
| elegantissima | 3/6 to | 5 | 0 |
| erecta | 1/6 to | 5 | 0 |
| aurea variegata | 2/6 to | 5 | 0 |
| lutea | 1/6 to | 7 | 6 |
| viridis | 1/6 to | 5 | 0 |
| filifera | 2/6 to | 7 | 6 |
| glauca | 1/6 to | 3 | 6 |
| gracilis | 1/6 to | 3 | 6 |
| juniperina | 1/6 to | 3 | 6 |
| lutea | 1/6 to | 7 | 6 |
| nana *(compacta)* | 1/ to | 5 | 0 |
| obtusa | | 3 | 6 |
| picta argentea | 2/6 to | 7 | 6 |
| pyramidalis alba spica | 5/ to | 7 | 6 |
| stricta, 12 to 24 inches | 1/ to | 2 | 6 |
| 2 to 3 feet | 2/6 to | 3 | 6 |
| stricta *(Waterer's var.)* | 1/6 to | 5 | 0 |
| variegata aurea | 2/6 to | 7 | 6 |
| argentea | 5/ to | 10 | 6 |
| Lindleyana *(Knightiana)*, 2 feet, | 2/6 to | 3 | 6 |
| 2 to 3 feet | | 5 | 0 |
| lusitanica, 2 to 3 feet | 2/6 to | 5 | 0 |
| Macnabiana, 9 to 12 inches | | 1 | 0 |
| 18 to 30 inches | | 2 | 6 |
| macrocarpa, 12 to 18 inches | | 1 | 0 |
| 18 to 24 inches | 1/6 to | 2 | 6 |
| 4 to 6 feet | 3/6 to | 5 | 0 |
| Nutkaensis *(Thujopsis borealis)*, | | | |
| 9 to 12 inches | per doz. 9/ | | |
| 12 to 18 inches | 1/ to | 1 | 6 |
| 2 to 3 feet | 2/6 to | 3 | 6 |
| nana compacta | 2/6 to | 21 | 6 |
| variegata | 3/6 to | 5 | 0 |
| retrofracta | 1/ to | 5 | 0 |
| sayreana | | 2 | 6 |
| sempervirens stricta, 18 to 24 in., | 1/ to | 2 | 6 |
| horizontalis, 12 to 15 inches, | per doz. 4/ | | |
| 18 to 24 inches | | 1 | 0 |
| CUPRESSUS, *continued*— | | | |
| sempervirens variegata | | 3 | 6 |
| torulosa | 1/6 to | 2 | 6 |
| nana, 3 to 6 inches | 2/6 to | 3 | 6 |
| thujæformis, 1 to 2 feet | 1/ to | 2 | 6 |
| Uhdeana, 12 to 24 inches | | 1 | 6 |
| Whitleyana, 1 to 2 feet | 1/6 to | 3 | 6 |
| DACRYDIUM— | | | |
| Colensoi | 1/6 to | 3 | 6 |
| cupressinum | 2/6 to | 5 | 0 |
| Franklinii | 2/6 to | 5 | 0 |
| FITZROYA— | | | |
| Patagonica, 6 to 12 inches | | 1 | 0 |
| 3 to 4 feet | | 2 | 6 |
| FRENELA australis | | 2 | 6 |
| GLYPTOSTROBUS sinensis | | 2 | 6 |
| JUNIPERUS. Juniper— | | | |
| attica | 1/6 to | 2 | 6 |
| bermudiana | | 2 | 6 |
| Chinensis, 12 to 18 inches | 1 to | 1 | 6 |
| 2 to 3 feet | 2/6 to | 3 | 6 |
| argentea variegata | 2/6 to | 10 | 6 |
| aurea | 2/6 to | 21 | 0 |
| communis, 12 to 18 in. | per 100 25/ | | |
| arborea, 6 to 9 in. | „ 12/6 | | |
| 12 to 18 inches | „ 30/ | | |
| hibernica *(Irish Juniper)*, | | | |
| 9 to 12 inches | per doz. 6/ | | |
| 12 to 18 inches | | 1 | 0 |
| compressa | 2/6 to | 5 | 0 |
| suecica *(Swedish Juniper)*, | | | |
| 6 to 12 inches | per doz. 6/ | | |
| cracovia, 12 to 15 inches | | 1 | 0 |
| decumbens | | 1 | 6 |
| drupacea | 2/6 to | 3 | 6 |
| dumosa | 1/6 to | 2 | 6 |
| excelsa, 6 to 12 inches | | 1 | 6 |
| 12 to 24 inches | 2/6 to | 3 | 6 |
| stricta | 2/6 to | 7 | 6 |
| fragrans | 2/6 to | 3 | 6 |
| gossainthanea | 1/6 to | 3 | 6 |
| Henryana | 3/6 to | 5 | 0 |
| humilis | | 2 | 6 |
| Japonica | | 1 | 0 |
| nana, 6 inches | | 1 | 0 |
| 9 to 12 inches | 1/6 to | 2 | 6 |
| Lawsoniana | 2/6 to | 5 | 0 |
| Marshalii | 2/6 to | 3 | 6 |
| oblonga *(interrupta)* | | 2 | 6 |
| pendula | 2/6 to | 5 | 0 |
| oxycedrus | 1/6 to | 3 | 6 |
| phœnicea | | 1 | 6 |
| Lycia | | 1 | 6 |
| prostrata | | 1 | 0 |
| Pseudo-Sabina | | 1 | 6 |
| recurva | 1/ to | 3 | 6 |
| densa | 1/6 to | 2 | 6 |
| religiosa *(Royle)* | 2/6 to | 5 | 0 |
| rigida *(Lindley)* | 2/6 to | 5 | 0 |
| Sabina, 9 to 12 in. | per 100 30/ | | |
| 12 to 18 inches | „ 50/ | | |
| 18 to 24 inches | „ 75/ | | |
| variegata | 1/ to | 2 | 6 |
| tamariscifolia | 1/ to | 1 | 6 |
| Sabiniodes | 1/ to | 3 | 6 |
| Schottii | 1/6 to | 2 | 6 |
| Smithiana, 6 to 12 inches | | 1 | 6 |
| 18 to 24 inches | | 2 | 6 |
| pendula | | 5 | 0 |
| sphærica, 12 to 18 inches | 1/6 to | 2 | 6 |
| glauca, 6 to 12 inches | | 2 | 6 |
| squamata *(Lambertiana)*, 9 to 12 in. | | 1 | 0 |
| thurifera | 1/6 to | 3 | 6 |
| tripartita | 1/ to | 2 | 6 |
| Virginiana *(Red Cedar)*— | | | |
| 12 to 18 inches | per doz. 6/ | | |
| 2 to 3 feet | | 1 | 0 |
| alba spica *(new and fine)* | 2/6 to | 7 | 6 |
| argentea | 1/6 to | 3 | 6 |
| aurea | 1/6 to | 3 | 6 |
| elegans | | 5 | 0 |
| glauca | 1/6 to | 5 | 0 |
| pendula | 1/6 to | 3 | 6 |
| viridis | 1/6 to | 5 | 0 |

| | Each—*s.* | *d.* |
|---|---|---|
| LARIX. Larch— | | |
| Americana pendula | 3/6 to 7 | 6 |
| dahurica, 1 to 2 feet | 1/6 to 2 | 6 |
| europæa. *See* Larch. | | |
| pendula, 4 to 6 feet | 5/ to 7 | 6 |
| Griffithii | 2 | 6 |
| Ledebourii | 2/6 to 5 | 0 |
| leptolepis | 3/6 to 5 | 0 |
| microcarpa | 2 | 6 |
| sibirica | 1 | 6 |
| LIBOCEDRUS— | | |
| Chilensis, 9 to 12 inches | 1/6 to 2 | 6 |
| decurrens, 6 to 9 in. | per 100 50/ | |
| 12 to 15 inches | 1 | 0 |
| 1½ to 2 feet | 1 | 6 |
| 2 to 3 feet | 2/6 to 3 | 6 |
| Doniana | 5/ to 42 | 0 |
| tetragona | 2/6 to 5 | 0 |
| PHYLLOCLADUS— | | |
| asplenifolius | 2 | 6 |
| rhomboidalis | 3 | 6 |
| trichomanoides | 3 | 6 |
| PICEA. Silver Fir— | | |
| amabilis | 3/6 to 21 | 6 |
| Apollinis, 6 to 9 inches | 1 | 0 |
| balsamea. *See* Balm of Gilead. | | |
| bifida *(Abies firma)* | 2/6 to 10 | 6 |
| bracteata | 2/6 to 7 | 6 |
| Cephalonica, 6 to 9 inches | 1 | 0 |
| 2 to 6 feet | 5/ to 21 | 0 |
| cilicica | 2/6 to 3 | 6 |
| concolor, 6 to 9 inches | 3 | 6 |
| 9 to 12 inches | 5/ to 7 | 6 |
| violacea, 6 to 9 inches | 5 | 0 |
| Fraserii, 6 to 9 inches | 1 | 0 |
| 12 to 18 inches | 1/6 to 2 | 6 |
| 2 to 3 feet | 2/6 to 3 | 6 |
| grandis *(true)*, 9 to 12 inches | 2 | 6 |
| 24 to 30 inches | 5/ to 7 | 6 |
| Hudsonica | 2 | 6 |
| Homolepis. *See* Veitchii. | | |
| Lasiocarpa, 12 to 18 inches (seedlings) | 3/6 to 5 | 0 |
| 18 to 24 inches | 5/ to 7 | 6 |
| 2 to 4 feet | 7/6 to 21 | 0 |
| magnifica, 6 to 9 in., seedlings | 3 | 6 |
| 12 to 24 inches | 5/ to 10 | 6 |
| 2 to 3 feet | 15 | 0 |
| 3 to 4 feet | 21 | 0 |
| nobilis, 6 to 12 inches | 1/ to 1 | 6 |
| 12 to 18 inches | 1/6 to 2 | 6 |
| 18 to 24 inches | 2/6 to 3 | 6 |
| 2 to 3 feet | 3/6 to 7 | 6 |
| 3 to 5 feet | 7/6 to 21 | 0 |
| glauca | 3/6 to 42 | 0 |
| Nordmanniana, 4 to 6 inches, | per doz. 6/ | |
| 9 to 18 inches | 1/ to 1 | 6 |
| 2 to 3 feet | 3/6 to 7 | 6 |
| Numidica | 2/6 to 5 | 0 |
| Parsonsii. *See* Lasiocarpa. | | |
| pectinata. *See* Silver Fir. | | |
| pichta, 1 to 2 feet | 2/6 to 3 | 6 |
| pindrow, 3 to 4 feet | 3/6 to 5 | 0 |
| Pinsapo, 9 to 12 inches | 1 | 0 |
| 1 to 2 feet | 1/6 to 2 | 6 |
| 2 to 3 feet | 3/6 to 7 | 6 |
| rigida | 2/6 to 5 | 0 |
| variegata | 3 | 6 |
| Reginæ-Amaliæ | 1/6 to 2 | 6 |
| Veitchii (Homolepis) | 3/6 to 21 | 0 |
| Webbiana | 5/ to 7 | 6 |
| PINUS *(True Pine)* aristata | 2/6 to 3 | 6 |
| austriaca. *See* Black Austrian Pine. | | |
| variegata | 2/6 to 5 | 0 |
| Balfouriana | 5 | 0 |
| Banksiana | 3/6 to 7 | 6 |
| PINUS, *continued*— | | |
| Beardsleyii | 2/6 to 10 | 6 |
| Benthamiana | 1/ to 5 | 0 |
| bermuja | 2/6 to 3 | 6 |
| Bolanderii | 2 | 6 |
| brutia | 1/6 to 2 | 6 |
| Bungeana | 2/6 to 7 | 6 |
| calabrica | 2 | 6 |
| Cembra nana | 2/6 to 5 | 0 |
| pygmea | 2/6 to 5 | 0 |
| contorta, 1 to 2 feet | 2/6 to 3 | 6 |
| densiflora | 3/6 to 10 | 6 |
| excelsa, 6 to 12 in. | per doz. 6/ | |
| 12 to 24 inches | 1/ to 1 | 6 |
| gracilis | 3 | 6 |
| nana | 3 | 6 |
| rigida | 3 | 6 |
| flexilis | 3/6 to 7 | 6 |
| Fremontiana. *See* monophylla. | | |
| Gerardiana | 2/6 to 10 | 6 |
| Halepensis | 1 | 0 |
| inops | 1/ to 2 | 6 |
| insignis, 9 to 12 inches | 1 | 0 |
| 12 to 18 inches | 1 | 6 |
| Jeffreyii. 12 to 18 inches | 1/6 to 2 | 6 |
| 2 to 3 feet | 3/6 to 5 | 0 |
| Koraiensis, 9 to 18 inches | 2/6 to 3 | 6 |
| 2 to 3 feet | 5/ to 7 | 6 |
| Lambertiana, 9 to 12 in. | 1/6 to 2 | 6 |
| 12 to 18 inches | 2/6 to 3 | 6 |
| 2 to 3 feet | 5/ to 7 | 6 |
| Laricio. *See* Corsican Pine. | | |
| Bugotii | 2/6 to 3 | 6 |
| pygmea | 2/6 to 5 | 0 |
| Llaveana | 2/6 to 5 | 0 |
| macrocarpa *(Coulterii)*, 1 to 2 ft. | 2 | 6 |
| 2 to 3 feet | 3/6 to 5 | 0 |
| Massoniana | 2/6 to 7 | 6 |
| monophylla *(Fremontiana)*, 6 to 12 inches | 5 | 0 |
| 1 to 2 feet | 7 | 6 |
| monticola, 9 to 12 inches | 2 | 6 |
| 2 to 3 feet | 3/6 to 7 | 6 |
| muricata, 9 to 12 inches | 2 | 6 |
| Murrayana, 6 to 12 inches | 3 | 6 |
| Pallasiana. 1 to 2 feet | 1 | 0 |
| 2 to 3 feet | 2 | 6 |
| parviflora, 12 to 18 in. | 3/6 to 5 | 0 |
| 18 to 30 inches | 5/ to 7 | 6 |
| patula | 2 | 6 |
| Peuce, 1 to 2 feet | 2/6 to 5 | 0 |
| Pinea | 1/ to 2 | 6 |
| fragilis | 3 | 6 |
| ponderosa, 6 to 9 inches | 1 | 0 |
| 1½ to 2 feet | 2/6 to 5 | 0 |
| Pumilio. *See* Mountain Pine. | | |
| pungens | 1/ to 2 | 6 |
| pyrenaica, 12 to 18 inches | 1/6 to 2 | 6 |
| 18 to 24 inches | 2/6 to 3 | 6 |
| radiata, 12 to 18 inches | 1/ to 2 | 6 |
| rigida, 6 to 9 inches | 1 | 0 |
| 2 to 3 feet | 2 | 6 |
| Russelliana | 2 | 6 |
| Sabiniana, 6 to 9 inches | 1/6 to 2 | 6 |
| 12 to 18 inches | 2/6 to 3 | 6 |
| 2 to 3 feet | 3/6 to 5 | 0 |
| Strobus. *See* Weymouth Pine. | | |
| alba | 2/6 to 3 | 6 |
| nivea | 2/6 to 3 | 6 |
| nana | 2/6 to 3 | 6 |
| tabulæformis | 2/6 to 3 | 6 |
| sylvestris. *See* Scotch Fir. | | |
| argentea variegata *(fine)* | 3/6 to 10 | 6 |
| aurea *(fine)* | 3/6 to 10 | 6 |
| globosa | 1/6 to 2 | 6 |
| M'Intoshiana | 2/6 to 5 | 0 |
| nana | 2/6 to 5 | 0 |
| pendula | 2/6 to 5 | 0 |
| PINUS, *continued*— | | |
| sylvestris pumila | 2/6 to 3 | 6 |
| uncinata | 2/6 to 3 | 6 |
| Tæda | 1/6 to 2 | 6 |
| Taurica | 1/6 to 2 | 6 |
| tuberculata | 2/6 to 3 | 6 |
| PODOCARPUS— | | |
| andina | 1 | 6 |
| bugotensis | 2/6 to 3 | 6 |
| chilina | 1/6 to 2 | 6 |
| dacrydioides | 3/6 to 5 | 0 |
| Japonica | 1/6 to 7 | 6 |
| elegantissima | 3/6 to 5 | 0 |
| macrophylla aurea | 7 | 6 |
| argentea | 7 | 6 |
| PRUMNOPITYS— | | |
| elegans | 1/6 to 3 | 6 |
| PSEUDO-LARIX, Golden Larch— | | |
| Kæmpferii | 5/ to 10 | 6 |
| RETINOSPORA—ericoides | 1/ to 2 | 6 |
| filicoides | 2 | 6 |
| filifera | 2/6 to 5 | 0 |
| Keteleerii variegata | 3/6 to 7 | 6 |
| leptoclada | 2/6 to 5 | 0 |
| lycopodioides | 2/6 to 7 | 6 |
| obtusa. 12 to 18 in. | per doz. 6/ | |
| 18 to 24 inches | 1/ to 1 | 6 |
| alba nivea | 3 | 6 |
| aurea | 2/6 to 5 | 0 |
| gracilis nana | 3 | 6 |
| nana aurea | 2/6 to 5 | 0 |
| compacta | 2/6 to 10 | 6 |
| robusta | 2/6 to 3 | 6 |
| pygmæa | 2/6 to 5 | 0 |
| pisifera, 9 to 12 in. | per doz. 6/ | |
| 18 to 24 inches | 1/ to 1 | 6 |
| 2 to 3 feet | 1/6 to 2 | 6 |
| aurea | 1/ 2/6 to 7 | 6 |
| argentea | 1/, 2/6 to 7 | 6 |
| stricta | 3/6 to 5 | 0 |
| plumosa | 2/6 to 7 | 6 |
| aurea | 1/6, 2/6 to 7 | 6 |
| squarrosa, 9 to 12 inches | 1 | 0 |
| 1½ to 2 feet | 1/6 to 2 | 6 |
| glauca | 1 | 0 |
| tetragona aurea | 5/ to 7 | 6 |
| SALISBURIA, Maiden Hair Tree— | | |
| adiantifolia | 1/6 to 3 | 6 |
| dissecta | 3 | 6 |
| variegata | 5 | 0 |
| laciniata | 3 | 6 |
| macrophylla incisa | 3 | 6 |
| SAXE-GOTHÆA— | | |
| conspicua, 9 to 12 inches | 1/ to 1 | 6 |
| gracilis, 4 to 9 inches | 1 | 6 |
| SCIADOPITYS verticillata *(Umbrella Pine)* | 5/ to 42 | 0 |
| SEQUOIA *(Taxodium)*— | | |
| Lawsoniana | 2/6 to 10 | 6 |
| sempervirens, 18 to 24 inches | 1 | 0 |
| 3 to 5 feet | 2 | 6 |
| Wellingtonia, 6 to 9 inches, | per doz. 12/ | |
| 12 to 18 inches | 1/6 to 2 | 6 |
| 18 to 24 inches | 2/6 to 3 | 6 |
| 2 to 3 feet | 3/6 to 5 | 0 |
| pendula | 3/6 to 10 | 6 |
| variegata | 3/6 to 10 | 6 |
| TAXODIUM. deciduous Cypress— | | |
| distichum | 1/ to 2 | 6 |
| sempervirens. *See* Sequoia. | | |
| TAXUS, Yew— | | |
| adpressa, 18 to 24 inches | 2 | 6 |
| stricta | 1/6 to 3 | 6 |
| variegata | 3/6 to 10 | 6 |
| baccata *(Common Yew)*— | | |
| aurantiaca | 1/ to 2 | 6 |
| Barroni fæmina | 3/6 to 5 | 0 |
| TAXUS, *continued*— | | |
| baccata brevifolia | 1/6 to 2 | 6 |
| Cheshuntensis, 2 to 3 feet | 2/6 to 3 | 6 |
| Daviesii, 1 to 2 feet | 1/6 to 2 | 6 |
| Dovastonii, 9 to 12 inches | 1 | 6 |
| 12 to 18 inches | 2 | 6 |
| variegata | 5/ to 10 | 6 |
| elegantissima, 9 to 18 in. | 1/6 to 3 | 6 |
| erecta, 3 to 4 feet | 2/6 to 3 | 6 |
| ericoides | 2/6 to 5 | 0 |
| fastigiata *(Irish Yew)*, 1 to 2 feet | 1 | 0 |
| 3 to 4 feet | 1/6 to 2 | 6 |
| 4 to 5 feet | 2/6 to 3 | 6 |
| variegata argentea | 2/6 to 5 | 0 |
| aurea | 2/6 to 10 | 6 |
| Foxii, 12 inches | 1 | 6 |
| fructu-luteo, 18 to 24 in. | 1/6 to 2 | 6 |
| 2 to 3 feet | 2/6 to 3 | 6 |
| glauca *(Blue John)*. 1 to 2 feet | 1 | 6 |
| 2 to 3 feet | 2 | 6 |
| incurva | 1 | 6 |
| Jacksonii, 12 to 18 inches | 1 | 6 |
| latifolia, 2 to 3 feet | 5 | 0 |
| Neidpathensis *(Neidpath Castle Yew)*, 18 to 24 inches | 1/6 to 2 | 6 |
| 2 to 4 feet | 2/6 to 3 | 6 |
| pyramidalis aurea variegata | 2/6 to 21 | 0 |
| recurvata | 1/6 to 2 | 6 |
| sparsifolia | 2/6 to 3 | 6 |
| stricta, 2 to 3 feet | 2 | 6 |
| variegata argentea | 2/6 to 5 | 0 |
| aurea, 12 to 18 inches | 1/6 to 3 | 6 |
| 18 to 24 inches | 3/6 to 5 | 0 |
| Washingtonii, 1 to 2 feet | 1 | 6 |
| 2 to 3 feet | 2 | 6 |
| Youngii | 1/6 to 2 | 6 |
| canadensis | 1/ to 2 | 6 |
| variegata | 2/6 to 7 | 6 |
| cuspidata | 2/6 to 7 | 6 |
| Koriana *(T. Japonica)*, 12 to 18 in. | 1/6 to 2 | 6 |
| Lindleyana, 1 to 2 feet | 2/6 to 3 | 6 |
| THUJA. Arborvitæ. *See* Biota. | | |
| Craigiana | 1/6 to 3 | 6 |
| gigantea. *(See Libocedrus decurrens.)* | | |
| Menziesii *(Lobii)*— | | |
| 24 to 30 inches, | per doz. 12/ | |
| occidentalis *(American Arborvitæ)*. 2 to 3 feet | per doz. 6/ | |
| argentea *(Queen Victoria)*, | 3/6 to 7 | 6 |
| compacta, 2 to 3 feet | 2 | 6 |
| ericoides *(Elwangerii)* | 1/ to 5 | 0 |
| globosa, 2 to 2½ feet | 2 6 to 3 | 6 |
| Hoveyii | 2 | 6 |
| lutea *(George Peabody)* | 3/6 to 10 | 6 |
| pendula | 1/6 to 2 | 6 |
| Vervæneana, 12 to 18 inches | 1 | 0 |
| 18 to 24 inches | 1/6 to 2 | 6 |
| variegata | 2/6 to 5 | 0 |
| plicata *(Wareana)*, 12 to 18 in., | per doz. 6/ | |
| 18 to 24 inches | ,, 9/ | |
| 2 to 3 feet | ,, 12/ | |
| THUJOPSIS borealis. *See* Cupressus Nutkaensis. | | |
| dolabrata | 1/6 to 7 | 6 |
| variegata | 1/6 to 7 | 6 |
| lætevirens | 1/6 to 5 | 0 |
| Standishii *(Thuja)* | 2/6 to 7 | 6 |
| TORREYA— | | |
| grandis, 1 foot | 3 | 6 |
| myristica, 9 to 12 inches | 3 | 6 |
| 1 to 2 feet | 3/6 to 7 | 6 |
| nucifera | 3/6 to 7 | 6 |
| taxifolia | 5/ to 10 | 6 |
| WELLINGTONIA gigantea. *See* Sequoia. | | |

## *II.—SEEDLING AND TRANSPLANTED CONIFEROUS FOREST TREES*

| | Per 1000—*s.* | *d.* |
|---|---|---|
| BLACK AUSTRIAN PINE— | | |
| 1 year seedlings | 3 | 6 |
| 2 years seedlings | 5 | 0 |
| 1 year seedlings, 1 year transplanted | 10 | 0 |
| 2 years seedlings, 1 year transplanted | 12 | 6 |
| 2 years seedlings, 2 years transpl. | 17 | 6 |
| 9 to 15 inches, twice transplanted | 25 | 0 |
| 12 to 18 inches, twice transplanted | 35 | 0 |
| CEMBRA, or SWISS STONE PINE— | | |
| 18 to 24 inches, transplanted, | per 100 25/ | |
| 2 to 3 feet, transplanted, | ,, 50/ | |
| 3 to 4 feet, several times transpl., | per 100 75/ to 100/ | |
| 4 to 6 feet, several times transpl., | per doz. 18/ to 30/ | |
| CORSICAN PINE— | | |
| 1 year seedlings | 3 | 6 |
| 2 years seedlings *(fine)* | 5 | 0 |
| 2 years seedlings, 1 year transpl. | 10 | 6 |
| 2 years seedlings, 2 years transpl. | 25 | 0 |
| LARCH, Native *(best quality, with perfect leaders)*— | | |
| 1 year seedlings *(fine)* | 2/6 to 3 | 6 |
| LARCH, Native, *continued*— | | |
| 2 years seedlings *(fine)* | 7 | 6 |
| 1 year seedlings, 1 year transplanted | 10 | 6 |
| 2 years seedlings, 1 year transplanted | 15 | 0 |
| 1 year seedlings, 2 years transplanted | 21 | 0 |
| 2 years seedlings, 2 years transpl. | 25 | 0 |
| 2 to 3 feet, transplanted *(fine)* | 35 | 0 |
| 3 to 4 feet, transplanted | 40 | 0 |
| LARCH, Tyrolese— | | |
| 1 year seedlings | 2/6 to 3 | 6 |
| 2 years seedlings | 7 | 6 |
| 1 year seedlings, 1 year transplanted | 10 | 6 |
| 2 years seedlings, 1 year transplanted | 15/ to 17 | 6 |
| 1 year seedlings, 2 years transpl. | 21 | 0 |
| 2 years seedlings, 2 years transpl. | 25 | 0 |
| 2 to 3 feet, transplanted | 35 | 0 |
| 3 to 4 feet, transplanted | 40 | 0 |
| MARITIME PINE, Pinaster or French— | | |
| 1 year seedlings | 5 | 0 |
| 6 to 12 inches, transplanted | 12 | 6 |
| 12 to 18 inches, transplanted | 25 | 0 |
| MOUNTAIN PINE— | | |
| 2 years seedlings | 5 | 0 |
| 1 year seedlings, 2 years transpl. | 10 | 0 |
| 2 years seedlings. 2 years transpl. | 21 | 0 |
| 18 to 30 inches, transpl. | per 100 21/ | |
| MUGHO PINE— | | |
| 2 years seedlings | 5 | 0 |
| 1 year seedlings, 2 years transpl. | 12 | 6 |
| 2 years seedlings, 2 years transpl. | 17 | 6 |
| SCOTCH FIR, True Native— | | |
| 1 year seedlings | 2/ to 2 | 6 |
| 2 years seedlings | 2/6 to 3 | 6 |
| 1 year seedlings, 1 year bedded | 5 | 0 |
| 2 years seedlings, 1 year transpl. | 12 | 6 |
| 2 years seedlings, 2 years transpl. | 21 | 0 |
| 12 to 18 inches, transplanted | 25 | 0 |
| SILVER FIR, American, or Balm of Gilead— | | |
| 2 years seedlings, 2 years bedded | 10 | 0 |
| SILVER FIR, Common— | | |
| 2 years seedlings | 7 | 6 |
| 6 to 9 inches, transplanted | 15 | 0 |
| 9 to 12 inches, transplanted | 25 | 0 |
| 12 to 18 inches, transplanted | 35 | 0 |
| SPRUCE, Norway or Common— | | |
| 3 years seedlings *(fine)* | 5 | 0 |
| 6 to 9 inches, transplanted | 10 | 6 |
| 9 to 12 inches, transplanted | 12 | 6 |
| 12 to 18 inches, transplanted | 17 | 6 |
| SPRUCE, Black American— | | |
| 12 to 18 in., transpl. | per 100 15/ | |
| 18 to 24 in., transpl. | ,, 30/ | |
| 2 to 3 feet, transpl. | ,, 75/ | |
| 3 to 4 feet | ,, 100/ | |
| SPRUCE, White American— | | |
| 3 years seedlings | 10 | 0 |
| 9 to 18 in., transpl. | per 100 10/ | |
| 1½ to 2 feet, transpl. | ,, 20/ | |
| WEYMOUTH PINE— | | |
| 2 years seedlings | 7 | 6 |
| 6 to 9 inches, transplanted | 50 | 0 |
| 9 to 15 inches, transplanted | 75 | 0 |
| YEW, Common—2 years seedlings | 21 | 0 |
| 6 to 9 inches, transplanted | 75 | 0 |
| 12 to 18 in., transpl. | per 100 25/ | |
| 18 to 24 in., transpl. | ,, 30/ | |
| 2 to 3 feet, twice transpl. | ,, 75/ | |
| 3 to 4 feet, twice transplanted, | per 100 125/ to 200/ | |

We are informed that the prices in quantity for all the leading kinds are considerably below the above rates, and diminish in the inverse ratio as the order is given for dozens, hundreds, and thousands. The address of the Lawson Seed and Nursery Company is, George IV. Bridge, Edinburgh, and 106 Southwark Street, London.

# GENERAL INDEX

## I.—GENERA, SPECIES, VARIETIES, AND THEIR SCIENTIFIC SYNONYMS

The Genera are indicated by capitals. The Species and Varieties described in the work are distinguished by SMALL CAPITALS; the others are in small type. Synonyms are marked with an asterisk (*). The page following the name in SMALL CAPITALS is that where the description will be found: the other pages named are those where the Species or Variety is incidentally referred to. To simplify reference, the Volumes are paged consecutively.

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# ERRATA.

Page 9, line 3 from bottom, *after* Mr Loudon speaks, *add* (Arboretum iv. p. 2279.)
,, 15, line 14, *for* white leaves *read* white bark.
,, 24, *for* Geographical Description *read* Geographical Distribution.
,, 32, line 14 (first col.), *for* Bownnoe *read* Boconnoc.
,, 41, in table at bottom of page, 2nd line from bottom, *for* Stafford *read* Hertford.
,, 43, line 9 from bottom, *for* Deddesley Park *read* Teddesley Park.
,, 43, line 6 from bottom, *for* Porthquedden *read* Porthgwidden.
,, 44, line 13 from bottom, do. do.
,, 44, line 1, *for* Fenedon Hall *read* Finedon Hall.
,, 45, line 7 from bottom, *for* Edinburgh Philosophical Journal *read* Edinburgh New Philosophical Journal.
,, 60, line 2 in table of heights, *for* Bownnoe *read* Boconnoc.
,, 75, line 7, *for* buds *read* birds.
,, 82, line 7, *for* Pamperford Hall *read* Pampesford Hall.
,, 89, line 16, *for* t. 83 *read* t. 63.
,, 89, line 16, *for* figs. 2188—2122 *read* 2118—2121.
,, 102, line 10, *for* their declivities *read* their western declivities.
,, 106, line 25 (first col.) *for* Hatfield House *read* Haffield House.
,, 106, line 25 (second col.), *for* Curclew *read* Carclew.
,, 106, line 4 (first col.), *for* Beaufort *read* Beauport.
,, 106, line 27 (first col.), *for* Herefordshire *read* Hertfordshire.
,, 106, line 22 (second col.), *for* Bownnoe *read* Boconnoc.
,, 126, line 11, *for* succeeding *read* succeeded.
,, 131, line 20, *for* 168 feet *read* 118 feet.
,, 132, line 7 (first col.), *for* Hatfield House *read* Haffield House.
,, 132, line 3 (second col.), *for* Bownnoe *read* Boconnoc.
,, 132, line 5 (third col.), *for* Tyrone, Cal. *read* Tyrone, Caledon Hill.
,, 146, line 12 from bottom, *for* smooth side *read* south side.
,, 153, line 1, *for* Hort. Soc. II. *read* Hort. Soc. III.
,, 156, lines 31 and 32, *read* one year seedlings 2s. 6d. each, and two year seedlings 5s. each.
,, 157, line 2, *for* Hort. Soc. II. p. 203 (1860), *read* Hort. Soc. III. p. 203 (1863).
,, 167, line 1, *for* Hort. Soc. II. *read* Hort. Soc. III.
,, 173, line 32, *for* Pinus nobilis *read* Picea nobilis.
,, 174, line 19, *for* two injured *read* two much injured, one injured by spring frosts only.
,, 180, line 4, *for* Jeddesley Park *read* Teddesley Park.
,, 181, line 1, *for* Lindley *read* Loudon.
,, 188, line 29, *for* Tinedon Hall *read* Finedon Hall.
,, 194, line 7, *for* in the same county *read* in Nottinghamshire.
,, 200, line 4 from bottom, *for* 58 in England, 17 in Scotland, *read* 61 in England, 14 in Scotland.
,, 204, line 3 in table of heights, *for* Bownnoe *read* Boconnoc.
,, 204, line 4, *for* Higham *read* Highnam.
,, 213, line 20, *for* Sir Abraham Janser *read* Sir Abraham Jansen.
,, 213, line 22, *for* trees *read* being.
,, 214, line 7, *for* twenty years *read* forty years.
,, 223, line 6 at end of line *add* different.
,, 224, line 10, *for* Derbyshire *read* Denbighshire.
,, 227, line 35, *for* seedling stem *read* leading shoot.
,, 237, line 8, *for* 1831 *read* 1822.
,, 247, after Larix Cedrus *add* Loudon Encyclopedia of Plants, p. 806 (1829).
,, 251, line 12 from bottom, *for* Lloyd *read* Loyd.
,, 252, line 3, *for* north-east *read* north-west.
,, 254, line 15 from bottom, *for* north-east *read* north-west.
,, 304, line 12, *for* generally *read* generically.
,, 306, last line, *for* fared *read* shared.
,, 317, line 2, *for* Ashford *read* Ashfield.
,, 319, line 7 (first col.), *for* Bicton *read* Exeter (Veitch's) nursery.
,, 319, line 19 (first col.), *for* Carmarthen *read* Glamorgan.
,, 319, line 5 (second col.), *for* Bownnoe *read* Boconnoc.

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